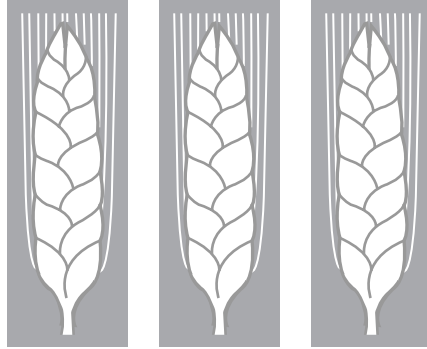


GREEN REVOLUTION
AGRICULTURAL AND SOCIAL CHANGE
IN A
NORTH INDIAN VILLAGE



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ABSTRACT

In the mid-1960s, rural India passed through a period of rapid technological and social change known as the Green Revolution. It was the transition from basically subsistence peasant farming at a low technological level to expensive commercial farming with modern technology. Five major sociotechnological innovations were basic to the Green Revolution: the development of high-yielding varieties of food grains, especially wheat and rice; land consolidation; private tubewell irrigation; mechanization; and the use of factory fertilizers and pesticides. New sources of energy, electricity and the internal combustion engine, which replaced bullock power, and the financial infrastructure that enabled farmers to buy the new equipment—tractors, tubewells, and threshers—represented a fundamental change. If the Green Revolution is taken in its broadest sense to include much higher educational levels and new employment opportunities in modern occupations, then the economy of Shanti Nagar, whose principal component is still agriculture, has been transformed.

This work is the 11th in a series of monographs, all published in the *Anthropological Papers of the American Museum of Natural History*, devoted to the description and analysis of life in Shanti Nagar (a pseudonym), a village in the Union Territory of Delhi. Our research is based on holistic fieldwork carried out in the village in 1957–1959 and 1977–1978, dates which make it possible to compare the village just before and after the Green Revolution. The most visible results of the Green Revolution were substantially increased production of the new high-yielding varieties of grain and increased prosperity for farmers, and indeed for almost all villagers. Because of the Green Revolution and associated developments in education and employment, the villagers of Shanti Nagar now lead a modern style of rural life supplemented by urban employment. These changes have also had the effect of enhancing equality, one of India's greatly desired social goals.

COVER ILLUSTRATION

Women winnowing wheat in 1958, before the Green Revolution of the mid-1960s.

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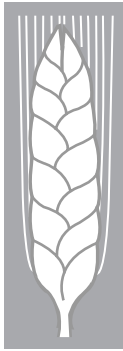
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PREFACE

WITH A POPULATION that recently passed the one billion mark, India will soon become the most populous nation on earth. India is still predominantly rural; about 75% of her people live in some 560,000 villages spread over more than three million square kilometers of variegated terrain. So many villages spread over such a vast territory means that there can be no typical Indian village. On the other hand, every village is in some ways typical of India. Believing that India could best be understood by studying life in one of her many villages, we settled in Shanti Nagar in 1958 to begin fieldwork that was ultimately to extend over two decades. When analysis and writing are taken into account, we have devoted the better part of 45 years to trying to explain why this small place is worthy of notice.

One reason is our belief that life in Shanti Nagar is generally typical of a large populous and prosperous rural region that extends from Punjab and Haryana to western Uttar Pradesh. The north Indian plain is one of the world's great agricultural regions. One of today's major global problems is managing the complex relations of sustainable food production and secure access of every person to basic nutritional requirements while population increases and the natural resource base may be impaired, for example, by "mining" the soil and/or by lowering the water table. Daily and her colleagues argued that the problem has to be studied at the local level. "The influence of household decisions is felt through local interactions . . . and thence upward globally. . . . Fine-tuning a system as complex as the food system . . . will require much more detailed local information than is typically available today" (Daily et al., 1998: 1292). A reliable, practical understanding of the social and environmental milieu of food production needs the local perspective in the form of comprehensive village studies.

The study of Shanti Nagar is important for another reason. From the 1950s to the 1970s, rural life in North India was marked by rapid social and technological change. In this regard, Shanti Nagar probably represents many, if not most, villages of the region. Although many aspects of village life were strongly affected during the period—for example, education, employment, and intercaste relations—change in agriculture, the economic base of village life, has attracted the most attention. Even the term, "Green Revolution", as the recent agricultural change is called, has a dramatic air and compels interest.

At the heart of the Green Revolution was the development of high-yielding hybrid varieties of wheat and rice, the basic food grains. Other features of the Green Revolution, such as land consolidation or mechanization, can to some extent be seen as enabling developments that permitted the full exploitation of the new high-yielding varieties. But whatever may be the connection of the new varieties and another development, such as the large-scale introduction of tractors, either of them could have taken place without the other. The temporal proximity of mechanization and the new seeds was partly fortuitous. Thus, either of the two events could be studied with little regard for the other, but for a more complete understanding, their relations have to be taken into account.

Yet another reason for taking an interest in Shanti Nagar is that the village represents the peasant style of life, which for millennia has characterized much of humanity. Peasant life is changing, both in India and elsewhere. Forming part of a larger society, peasant communities have limited power. It would be almost impossible for unaided villagers to transform quickly their economic, political, or social institutions. The source of power and change resides with the nation. Thus, the study of peasant communities requires that attention be paid to national goals, policies, and politics. A study of peasantry has to operate on two levels: the village itself and the state.

The people of Shanti Nagar accept, modify, or resist the policies enacted in Delhi. Villagers are not passive. They carefully examine governmental projects, select what is useful, resist harmful policies, and generally ignore laws that the Government does not intend to implement—at least not soon. Such triage may be the principal general feature of social change in peasant societies. Intellectually, it is a deceptively simple concept. As it plays out in a particular village, it is seen to be intricate, subtle, and important both for villagers and governmental functionaries.

What has happened in Shanti Nagar is relevant to its immediate region, but is it pertinent to changes in peasant life elsewhere? Only comparison with regions that have little or no connection with North India can place Shanti Nagar in a broader context and lead to useful generalizations. Moreover, comparison serves to control the tendency to generalize a particular case. For example, land consolidation and the widespread use of tractors go together in Shanti Nagar and its immediate area, and the connection appears to be logical. Tractors are inefficient when used on small plots of land, and therefore land consolidation is almost necessary. Is this proposition generally true? Only a comparative study can give an answer. Comparison is most useful when it is made between two countries that are dissimilar in culture, history, and social structure, for then contrasts are sharper and the importance of context is highlighted.

For purposes of comparison, we have selected the village of Peyrane in the Vaucluse in southern France. Wylie (1964) studied Peyrane during the 1950s, the decade of our first residence in Shanti Nagar. The 1950s in France and India were obviously different, but nonetheless the correspondence in time of the two studies suggests a point of departure. However, our choice of Peyrane was largely circumstantial. It happened that we read Wylie's book while in the early stages of writing this report, and life in Peyrane brought to mind Marcel Pagnol's novel, *Jean de Florette* (Pagnol, 1988), the tale of two hard, shrewd peasants who schemed successfully to take over valuable

land from its ingenuous owner. Set in a rural community near the Vaucluse, Pagnol's story, with a few adjustments, could easily have taken place in a north Indian village. Wylie's study reinforced our feeling of *déjà vu*, that we were already familiar with life in a French village because of what we had seen in India. We are sure that the villagers of Peyrane and Shanti Nagar would have understood each other very well.

Besides the similarities of livelihood and philosophy of life, there is a direct link between French and Indian peasants. Some 850,000 Indian soldiers left the subcontinent for service in World War I. Indian troops were in action on the Western Front in late October, 1914 (Gilbert, 1994: 93–94, 245).¹ Sir Malcolm Darling, who served in the Indian Civil Service from 1904 to 1940, attributes changes in Punjab since the First World War to the influence of returning veterans and to postwar prosperity:

Many of these changes [e.g., the growing popularity of brick houses] are due to the war, which revealed to the Indian villager who served in France an entirely new standard of housing and comfort. He saw there with astonishment and envy how well the peasant proprietor can live, and, returning to his village, beheld its cattle-shed life with a tinge of disgust. . . . In France he saw an entirely new order of rural life, and realized with surprise that the village could be as civilized as the town. He found the French peasant educated, prosperous, and independent, and for the first time he felt a discontent with his own surroundings, which has been slowly growing ever since. [Darling, 1978: 140, 263]

Our mode of anthropology is ethnographic, heavy on detailed description organized in standard categories (e.g., the family, caste, economy, etc.). This orientation lends itself well to functional analysis, an explanation of social phenomena in terms of their functions and their connections to other institutions. This approach usually yields a picture of a more or less well-integrated, smoothly functioning society or specific unit of a larger society, such as a village. Unabashed functionalism is sometimes considered old fashioned, but it is one of the bases of solid enduring ethnography. One of our distinguished professors, the late Robert Murphy, used to say, "In the field, everyone is a functionalist." This approach is as useful in a New York office as in the field.

Our functionalism does not result in a synchronic, static, idealized model of society. It would be impossible to study Indian life without taking into account India's long history, for village life at any moment is a complex of customs centuries or even millennia old, as well as artifacts and institutions of recent vintage. Our analysis goes well beyond a narrowly conceived functionalism, restricted to the culture and society of this one village, to broader environmental, historical, political, symbolic, and areal contexts. Moreover, the conflicts and tensions of village life are not passed over in silence. Arguments, lawsuits, fights, and even murders are constant features of village life.

Our ethnographic style has been strongly influenced by over 40 years of work in a museum. Museum work is based on ethnography, the more detailed, the better. We still vividly remember the "culture shock" of passing from the world of universities to museums. Suddenly we found ourselves reading monographs, a kind of publication now generally considered somewhat anachronistic, written by anthropologists

who had been rarely—if at all—mentioned in graduate school. It may be less true today, but university anthropologists for many years tended to regard museum anthropology as outmoded. A year after we joined the American Museum in 1960, one of our ex-professors asked, “When are you going to go out and get a real job?”

We remain strongly oriented toward descriptive ethnography, not out of loyalty to a “museum tradition”, but chiefly because the value of detailed ethnography grows rather than diminishes in the course of time. Description has a faintly pejorative air in anthropology. The principal kudos are awarded to ideas and theory. However, full description, which includes interpersonal variation and considerable attention to specific context, opens the door to the study of change and process. Although the context is literary, Nadeau succinctly makes this point in his preface to *Madame Bovary*: “Mr. B . . . reproaches Flaubert for his descriptive zeal without understanding that the scrupulous attention that the author devotes to describing ‘little things’ has as its goal the capturing of life in perpetual change and susceptible at every moment to diverse, even contradictory, interpretations” (Nadeau, 1972: 16–17).

We nonetheless think it prudent to offer a few words of commentary about the current climate of opinion in anthropology, for any substantial research effort will be judged not only by its contribution to the understanding of the subject under study, but also to some extent in terms of the present anthropological ambience. Many anthropologists are concerned and disturbed by the colonial context of pre-World War II anthropology. This postcolonial anguish probably has its origin in a feeling of cognitive dissonance. It is the disjunction between the paternalism of colonialism and the avowed confrontation of postcolonial times. Adams writes of his experiences on the Navajo Indian reservation where he grew up and later did ethnographic fieldwork:

[T]he benevolent paternalism I knew is gone. White man and Indian meet today as adult to adult, on a footing of avowed confrontation. . . . I have trouble accepting the paved roads and the motels and the tourist traps, but it is far more unsettling to find no surviving trace of the society and the culture in which I grew up. . . . As good anthropologists we should properly be able to accept the inevitability of social change. . . . Yet I am struck by how few of us have been able to do effective field work among the same people both in the colonial and in the post-colonial eras. . . . The cognitive shift required of us is too great. [Adams, 1986: 24–25]

Our professional experiences parallel those of Adams. We are of his generation; we worked with American Indians during the 1950s, as did he; and we even carried out a small project among the Navajo in the mid-1960s. We did not have similar emotional reactions, partly because the research circumstances were different, partly because of personality differences. Our first work was with the Washoe Indians, a very small tribe living in a few small scattered settlements with almost no governmental officials or traders constantly on the scene and but one rather unobtrusive missionary. The Washoe suffered the ethnic indignities common at the time, but colonialism seems too grand a term to apply in their case.

The Navajo were different, a tribe numbering some 80,000 members in the mid-1950s and 93,000 in the early 1960s (Johnston, 1966: 138, table 7)² with a reserva-

tion of 25,000 square miles, as large as Belgium and the Netherlands combined, in constant contact with governmental agencies, missionaries, and traders. Their situation can be regarded as colonial—with important qualifications, such as their full and equal status as American citizens. However our reaction was not one of paternalism and pity but of awe. Their title to a vast territory is protected by the power of the United States, and they benefit from a panoply of special health, educational, and other services provided by the government. They went through some bad times, but many of today's embattled peoples would envy their current peace, security, and privileged status.

Not everyone is cut out to be an ethnographer, and this perhaps is the chief difference between Adams' reaction to fieldwork and our own. He was disturbed by the intrusiveness of fieldwork, by the prying inquiries into personal affairs that interviewers themselves might find unwelcome if they were being questioned. We take the aggressiveness—persistence would perhaps be a better word—of ethnography as a necessary part of the trade. It is mild as compared to law, journalism, medicine, police work, salesmanship, and many other ordinary activities. Besides, one must not assume that questions regarded as sensitive in one society will necessarily be so in another. At the end of one of our field trips to the Washoe, we decided to ask adolescent girls about their sexual activities, feeling that if they did not want to talk about them and became angry, we had just about finished our work anyway. They didn't want to talk about sex? That's *all* they wanted to talk about, and right in front of their mothers too. On the other hand, working among the Navajo, we once included on a questionnaire a query that seemed perfectly innocuous to us but which, we later decided, was interpreted as a question about witchcraft. Our Navajo informants became nervous. In any case, the key to ethnography is simply being there, right in the middle of things, watching what goes on, and then asking people about it. People are usually delighted to explain. Most of what the ethnographer wants to know is right on the surface. Little by little, one can enter more private areas.

In India, we felt no trace of postcolonial angst. We arrived there 10 years after Independence and so never worked under colonial conditions. Moreover, we sensed few traces of bad feelings between Indians and English despite the powerful currents of racism that characterized the British Raj and that could lead to painful, humiliating episodes. The villagers described British officials for the most part as intelligent, honest, and incorruptible. We were at first startled and thought that they were just being polite, possibly confusing us with the British because we spoke English. Later, we decided that they really meant it.³ They might caricature a memsahib in a sketch, but there was neither hostility nor disrespect. Tandon (1968: 11–14) writes a warm tribute to the British Raj in Punjab. He concludes, "I think we must have found something in common between us and the Englishman which made us get on well together from the start" (Tandon, 1968: 14). What that "something" might have been is beyond the scope of this account. However, Tandon's testimony and the comments of the villagers do not lead to postcolonial anguish.

We use the pseudonym of Shanti Nagar for our village. Very early in our fieldwork, we briefly discussed with a few village men whether to use a pseudonym. One of them, proud of his village, did not want us to use a pseudonym, but one or two of

the others wanted its identity disguised. Moreover, pseudonyms for both places and individuals were standard practice in American anthropology at the time. One can be criticized for not using pseudonyms on the grounds that the welfare of the people is being put in jeopardy.

On the other hand, an Indian colleague, who recently visited us, spontaneously brought up the subject and said that our using a pseudonym was a bit silly. Everyone knows where we were. A French couple and an Indian American had no trouble finding the village, and the French couple even presented themselves at the door of our ex-landlord's house. He did not take them in. He told us later that he regarded Shanti Nagar to be our terrain and that the French couple was infringing. They easily found another host. Wylie (1964: vii) used the pseudonym Peyrane for his French village but, after his second visit to the village, he wrote, "Of course, there is no longer a reason for hiding the real name of the commune—Roussillon—since any interested person could discover it rather easily and since the book is well known to the people of Peyrane."

Our visiting Indian colleague's point of view was reasonable. An election for the village panchayat took place during our visit in the 1970s, and we wrote an account of it (S. Freed and R. Freed, 1987). It was a bit odd—"silly" as she would have it—that we felt constrained to use pseudonyms whereas a newspaper reporter covering the election, a public event, would have named the village, the candidates, and the village power brokers operating behind the scenes. The journalist would have learned everything that we learned; we doubt that our tact about pseudonyms would have given us any advantage in discovering the facts.

However, ethnographers are not journalists, who may spend only a few days in a locality to cover an event and then depart. Ethnographers stay for a year or more and usually establish close relations with many people. To name them would in some cases be tantamount to a betrayal. Moreover, pseudonyms protect the ethnographer, whose account will depend partly on hearsay which cannot be verified. If, in the judgment of the ethnographer, some village gossip is credible, it can be published if pseudonyms are used. Otherwise, the ethnographer, his source, and his subject could get into hot water. Journalists use a similar device when they credit a "high government official".

We note in passing that hearsay in Indian villages is often trustworthy. Chambard wrote:

It was often brought to my notice, in the course of my inquiries in the village, that public rumor generally reported facts exactly and precisely. The important role that oral tradition continues to play has something to do with the weak distortion brought about by this type of transmission. It is interesting to note that almost the exact opposite takes place in our country [France]. Circulation by word of mouth is enough for information to lose all credibility. [Chambard, 1980: 41, note 1]

We came to a similar conclusion. Widely spread rumors were generally correct. The reason was partly the role of oral tradition but perhaps more importantly the fact that the village was small and people lived all their lives in close contact with neighbors.

We often use morality-play names as pseudonyms for persons, a practice that we began with our study of the village election. The pseudonyms highlighted prominent personality traits, occupations, or noteworthy occurrences in peoples' lives. We believed that such names would make it much easier for readers to follow the election than any other system of pseudonyms. The village election featured a host of strong, distinctive players whose formidable personalities seemed almost to demand descriptive pseudonyms. Readers would have no trouble remembering the roles of Agitator and Probationer, who schemed and battled each other for years, or Young Soldier, Strongheart, and Unfortunate whose rendezvous on a rooftop led to murder. We continued the practice of morality-play pseudonyms in our monograph on death and ghosts (R. Freed and S. Freed, 1993). That report was full of case studies that involved a total of more than 150 participants. Morality-play pseudonyms were the only reasonable option.

We never sent copies of any of our publications back to Shanti Nagar. Our first monograph (S. Freed and R. Freed, 1976) was published before our second visit in 1977–1978 and we took a copy with us, intending to give it to the villagers. In the end, we decided not to do it. We were not sure how it would be received and wanted to avoid possible headaches. Our job was to write accurate reports and not to worry about what people might think. We liked the people very much, and our fondness probably shows from time to time in our writing. But if you write it as you see it, not everyone will be pleased, and you may hurt the feelings of a few people. Most problems of this nature were avoided because we write in English, a language that is not available to most villagers, certainly not at the level needed to plow through hundreds of pages of closely written text. Therefore, a family need not fear that intimate information will be revealed to neighbors. On the other hand, we probably obtained the “intimate” information from the neighbors in the first place.

Wylie unintentionally bruised a few people's feelings, but the hurt seemed to heal over the years. His Peyranais friends remained extremely cordial. The people who did not like his book were city folks who spent vacations in Peyrane or who had moved there since the book was written. They wanted to make Peyrane a vacation paradise for artists and intellectuals. The book was a straightforward account rather than an “artistically transformed reality” (Wylie, 1964: ix). The urbanites thought it unwise to talk about everything because it might not be so good for business. There are many reasons—commercial, political, theoretical, and professional—for passing off partially fictional accounts as honest ethnography. The practice is insidious, and readers have to be on their guard.

The Peyranais were not particularly concerned with the text but loved the photos. The villagers of Shanti Nagar had a similar reaction to our photos. To the extent possible, we distributed copies to villagers, especially portraits. We do not think that there were any cameras in Shanti Nagar in the 1950s, and so our photos assumed considerable sentimental value for some families. On our second trip, an informant called our attention to a photo of his late mother on the wall. It was one of our photos, enlarged and colored. Forty years later, the photos have a similar sentimental value for us, as have our fieldnotes and letters.

We have been both ethnographers in India and also members of a studied society in the United States and so can see both sides of ethnography—researcher and

subject. To celebrate its 50th anniversary in 1983, *Newsweek* decided to devote an entire special issue to the most typical American city that the editors could find. They "... drove into Springfield [Ohio] on a cold gray day last March and knew almost at once that it was the ideal setting" (Broyles, 1983: 3). Springfield is Stanley's hometown where he lived until the age of 18. Springfielders turned themselves inside out to help the *Newsweek* team. The special issue was published. Some of the local people didn't like it and complained. For the *Newsweek* team, the project was a labor of love, and they didn't understand the local reaction. *Newsweek* later sent some of their people back to Springfield to hold a meeting and explain the workings of a major editorial effort.

We could view the matter both from the point of view of ethnographer and native. We think that *Newsweek* did a fine job and that the selection of Springfield as the typical American city was an honor. We also realize that we knew little about the city until we read the issue. That is one reason why members of studied groups keep copies of published reports. They are surprised by how much they learn about their own society. The special issue of *Newsweek* now is one of our treasured souvenirs. The currently fashionable scorn sometimes heaped on ethnographers is transient. The enduring reaction, like our own, is one of appreciation for a permanent monument to a time and place.

We use *Webster's Third New International Dictionary* as the standard for writing Hindi words in English. For details, see the Appendix, section "Transcription of Hindi Words and Nomenclature". "Money and Measures", a section of the Appendix, explains the traditional Indian system of money, weights, and land measurement.

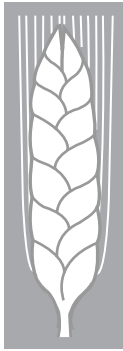
A glossary is combined with the index. Every Hindi word used in the text is entered in the index with a few words giving its English translation. Fuller information can be found in the text, usually at the first mention of the word. Other non-English words are treated in a similar fashion.

We were aided by many individuals and organizations during our fieldwork in the 1950s and the 1970s and for the years of analysis that followed. Their indispensable assistance and hospitality are acknowledged with thanks in S. Freed and R. Freed (1976: 28–29, 1982: 200–201, 1985: 232, note 1). For assistance with the current monograph, we thank Sarah Deleporte, Abhik Ghosh, Jane Lima, Elisenda Vila Llonch, Geraldine Santoro, Carl Sidney, and Louis Sorkin for their library research; Laila Williamson for criticism, suggestions, proofreading, and checking details; Bridgit Thomas and Petica Barry for handling images in the computer; Kevin DeVorse, Elaine Guthrie, and Russell Leighty for computer assistance; Manjit Chawla Misra for compiling the index; and Brenda Jones for suggestions, copyediting, and production.

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In particular, we extend our heartfelt thanks for the comments, criticisms, and suggestions given by the prepublication reviewers: Jeffrey P. Bonner, Doranne Jacobson, and Serena Nanda.

Finally, we thank the people of Shanti Nagar for admitting us into their village and treating us with kindness and hospitality. Nothing would have been possible without their acceptance and cooperation. Our days there are among our most cherished memories both for the people and for the beauty of the countryside. It is flat, no dramatic hills and cliffs, but beautiful for all that, like a carefully tended garden. To sit peacefully in the fields at sundown sipping tea made with brown sugar and buffalo's milk offered by a generous farmer was a magical moment. We concentrated intently, trying to fix it in our memories even as the shadows lengthened.



INTRODUCTION

SHANTI NAGAR: AN OVERVIEW

SHANTI NAGAR is in the Union Territory of Delhi, northwest of the City of Delhi. It is located about 11 miles (17.7 km) by road from Shakti Nagar, in the 1950s the most northern of the small named communities that constitute the City of Delhi.⁴ In the late 1950s, the city was beginning to extend beyond Shakti Nagar. Several villages are situated between Shanti Nagar and Delhi. Travel between Shanti Nagar and Delhi was relatively easy during the dry season in the 1950s. The road to Delhi was paved except for about 1 mile. A bus made four round trips daily, usually taking about an hour and a quarter between Shanti Nagar and the Old Delhi bus station. During the rainy season, travel was much more difficult. The bus traveled only to the end of the paved road, and passengers had to walk the rest of the way, often partly through water. A railway station was located about 2 or 3 miles from Shanti Nagar, and trains provided cheaper, if less convenient, transportation between Shanti Nagar and Delhi than did the bus. All buses had racks on their roofs for bicycles and other baggage. The combination of bus and bicycle was an efficient and economical way to travel. In the 1970s, the paved road had been extended to Shanti Nagar, which made commuting easier for the many people with jobs in Delhi. Most travel to Delhi was therefore by bus. However, buses were usually crowded both in the 1950s and the 1970s, and the trip was not a pleasure.

The large town of Narela is located about 4 miles (6.4 km) from Shanti Nagar. In the 1950s, the road between Shanti Nagar and Narela was unpaved but suitable for bullock carts and bicycles in dry weather. Narela has an important market where villagers sold most of the grain and gur (a brown sugar) not needed for family use. The district police station is also located in Narela. In the 1970s, the road to Narela was paved and the town could be reached by bus. Narela was as important to the people of Shanti Nagar in the 1970s as it had been in the 1950s (S. Freed and R. Freed, 1976: 31–32).

The greater ease of travel made neighboring villages more accessible in the 1970s than formerly. In the Shanti Nagar region, marriage is virilocal and patrilocal. Women marry out of their villages, which means that marriages generate a good deal of intervillage travel. In the 1950s, Shanti Nagar had marital alliances with more than 100 villages, towns, and cities, the most distant situated about 38 miles (61 km)

away. In addition, important facilities, such as dispensaries, shops, governmental offices, higher secondary schools, and colleges are located in nearby villages and are regularly used by the people of Shanti Nagar.

Shanti Nagar lies west of the Grand Trunk Road. The habitation site and about half the agricultural land are on land (called *bangar*) high enough above the Yamuna (Jumna, Jamuna) River to avoid flooding during the monsoon season. Flooding is a serious problem for the *khadar* (riverine) zone east of the Grand Trunk Road and also for some village land classified as *khadar* that lies east of the principal north-south road that passes through the village (fig. 1). The area designated *bani* in figure 1 is relatively poor land overgrown with shrubs and trees. Part of the village land is irrigated by the Delhi Branch of the Western Yamuna Canal. In the 1950s, Persian wheels mounted on masonry wells provided a small amount of additional irrigation. In the 1970s, private tubewell irrigation was probably of greater importance than canal water, and Persian wheels were no longer used.

Part of the village land had been largely spoiled by waterlogging. Under conditions of insufficient drainage, evaporation draws alkaline subsoil water to the upper levels of the soil where the salts accumulate in toxic quantities in the root zone and spread on the surface in their dehydrated crystalline form known as *reh* or *shor*. Waterlogging was a problem principally for the fields of Shanti Nagar that lay east of the road to Narela. According to villagers, they were four feet lower than fields to the west and six feet lower than fields of a neighboring village. Therefore, surplus water flowed into them.

The climate of the Shanti Nagar region features four seasons. Three are sharply marked: a dry hot season from March to June, the monsoon period from July to Sep-

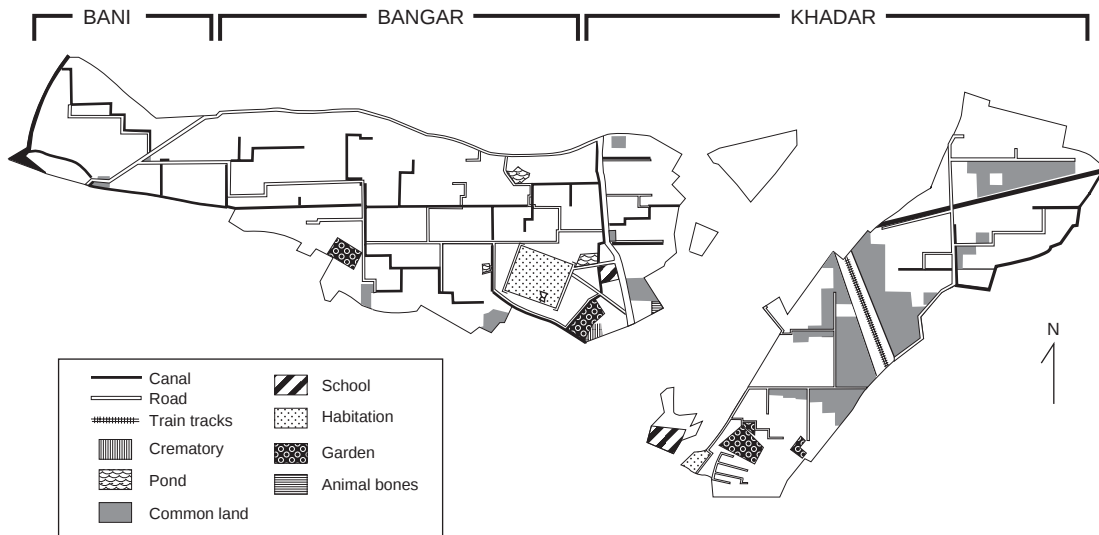


FIG. 1. Map of Shanti Nagar. Adapted and simplified from the cadastral map as revised after land consolidation in the 1970s. The area of the village is 1037 acres (420 ha), which is the average of the slightly different figures from the 1950s and the 1970s. See text for definitions of *bangar*, *bani*, and *khadar*.

tember, and a dry cold winter from December to February. The fourth season, October and November, is less distinctive than the other three. The Indian Meteorological Department calls it the “season of the Retreating South-West monsoon” (Mamoria, 1980: 42). The fading monsoon in September is followed by a brief hot spell. About 74% of the annual rainfall comes during the monsoon months, and if the pre-monsoon rains of late June are taken into account, the figure increases to about 80% (Delhi Administration, 1976: 33; Maheshwari, 1976: 3).

From the 15th of May, which date officially marks the beginning of the hot season, until the monsoon, unrelieved heat settles over the Delhi region. Once experienced, this heat is never forgotten. Daily maximum temperatures average 40.5°C (May) and 39.9°C (June) (Delhi Administration, 1976: table 3, p. 38). Temperatures of more than 43.3°C (110°F) are not uncommon. We remember standing in front of our house one morning in the predawn coolness watching the sunrise. Half of the sun was still below the horizon when heat struck us like an iron fist. We had to retreat inside the house. From April to the end of June, the *loo*, a hot dry wind, makes life unpleasant. The monsoon is a great relief, the average daily maximum temperature falling about 4.6°C (8.3°F) from June to July. Even though humidity increases substantially during the monsoon, the end of extreme heat makes the climate tolerable.

In winter, there are marked diurnal differences in temperature, so that the days are usually pleasant, but evenings and early mornings are often cold, although the temperature rarely approaches freezing. Nonetheless, temperatures around 7 or 8°C (45 to 46°F) can be quite uncomfortable in unheated village houses. In the 1950s, we wore sweaters, heavy jackets, and long underwear. Villagers who had them wrapped themselves in heavy quilts; a few wore coats. The winter of 1977–1978 was milder although still chilly. We began to work on our notes at 6:00 a.m., and our fingers were sometimes a bit stiff from the cold. Early morning was the best time to do paperwork, for the villagers were too busy to be visited until about 10:00 a.m. when the cattle⁵ had been milked, the family had eaten, the children were off to school, and urban workers had left for their jobs.

From an agricultural point of view, there are two principal seasons: summer-autumn for the kharif crops and winter-spring for the rabi crops. The chief kharif crops are sugarcane (in the 1950s), rice, jowar, bajra, and maize. Although planted in the spring and classified as a kharif crop, sugarcane is harvested and processed during the winter, thus straddling the two seasons. Sugarcane had almost disappeared from Shanti Nagar by the 1970s, having been replaced by tomatoes. Wheat dominates the rabi season, but it shared the winter with sugarcane in the 1950s and tomatoes in the 1970s. Although tomato fields look much different from fields of sugarcane, and the technology associated with gur (brown sugar) and *khand* (raw white sugar) production is entirely different from picking and packing tomatoes for the market, the rhythm of agriculture as lived by a farming family did not undergo much of a change. Both sugarcane and tomatoes are harvested during the winter, and the harvest continues for several months.

Replacement of sugarcane by tomatoes was by no means the only change that gave agriculture a different appearance in the 1970s. Individual fields were larger and more regularly shaped because of land consolidation and had a less jungly look because many trees had been cut down. Tractors had displaced bullocks for plowing and sowing,

and the traditional threshing floor where grain was threshed by bullocks and winnowed by hand had disappeared in favor of the powered threshing and winnowing machine. Charm had lost out to efficiency; but what might have seemed charming to the visitor was in fact murderously hard work for the farmer and laborer.

In its general configuration, the compact village habitation site, the non-agricultural area largely covered by buildings, did not look much different in the 1970s from the 1950s (figs. 2, 3). The houses were still crowded together, sometimes sharing one or more walls with neighboring houses. Streets and lanes were narrow. Most families were still living in the same locations where they lived in the 1950s.

There were, however, substantial differences. The paving of streets and lanes had been extended. The improved streets had drains on both sides. Poles and overhead electric wires crisscrossed the village. Handpumps were widespread, with the result that two village masonry wells, those that served the Harijans, had fallen into disrepair, and the main village well was little used. Mud (kachcha) houses, common in the 1950s, had been replaced by brick (pukka) houses. Some families razed their

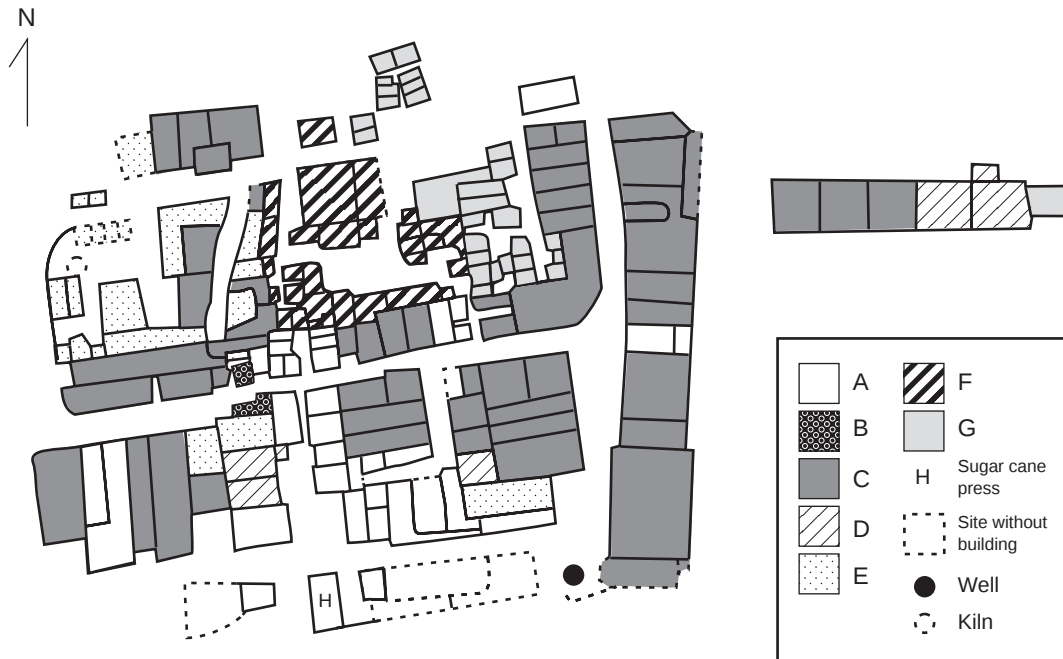


FIG. 2. Sketch map of Shanti Nagar, 1958–1959. Shaded areas indicate privately owned lots with a building that covers all or part of the site. A broken line represents a site claimed as private property but without a building. It may be enclosed by a wall or unenclosed. Unshaded areas are lanes available to everyone and courtyards used principally by members of families whose houses surround them. The different shaded areas denote the location of caste blocs as follows: A, Brahman Priest; B, Baniya Merchant; C, Bairagi Mendicant Priest and Jat Farmer; D, Jhinvar Watercarrier, Lohar Blacksmith, and Mali Gardener; E, Gola Potter, Mahar Potter, and Nai Barber; F, Chamar Leatherworker; and G, Chuhra Sweeper. A caste bloc is a caste or group of castes that occupies a particular rank in the caste hierarchy (S. Freed and R. Freed, 1976: 100–101). The Chhipi Dyer was a tenant and owned no house site. Therefore, that family is not represented on the map.



FIG. 3. Sketch map of Shanti Nagar, 1977–1978. The code is the same as in figure 2. A family of Khati Carpenters, who arrived in Shanti Nagar after our departure in 1959, owned no house site. Like the Chhipi Dyer family, it is not represented on the map.

old houses and built new larger ones on the same site. Other families left the older buildings standing but built new houses on nearby plots. Some families enlarged their houses with a second story. Construction was unregulated and could lead to disputes when a family built in such a way as to block the window of a neighboring house. Such a dispute erupted during our visit. Villagers told us that the offended family had little recourse. Despite housing renovation, an increasing population required additional plots for houses, and the habitation site had expanded slightly into village common land (figs. 2, 3).

The walls of kachcha houses were made of hard chunks of mud dug from dry ponds. Mud mixed with straw was used as mortar and to plaster the inside and outside of walls so that they were smooth and shed rain. Nonetheless mud houses were vulnerable during the monsoon. One day during the monsoon, we were startled by a roaring sound, and a man told us that the noise meant that a mud house had collapsed. We asked if the village would do anything for the victim, and he said no. In fact, he seemed surprised at our question. The doors, windows, and the columns supporting the flat roofs were made of wood. Rafters were wooden poles over which were laid reeds or sticks and, on top, a thick covering of mud. Kachcha houses were on the average much smaller than pukka houses.

Pukka houses had walls made of kiln-fired bricks. The walls were dug into the ground a few feet to provide a foundation. Stone columns supported heavy beams of the flat roof. Beams were usually of wood, but in a few houses steel beams were used. Boards were laid over the beams; bricks laid on the boards were covered with cement. Pukka houses often had decorative grills over doors and windows, impressive Moghul-style arches, and heavy wooden doors, sometimes ornamented with carving. Mud mixed with water was used as mortar for the walls of some houses. The walls had to be maintained, for this mortar tended to wash away at the edges during the monsoon. The pukka houses of the 1950s differed considerably in size, details of construction, ornamentation, and value (S. Freed and R. Freed, 1978: 143). Such variation was even more pronounced in the 1970s, as more pukka houses had been built in the intervening decades. One impressive architectural change in the 1970s was the use of heavy reinforced concrete roofs on pukka houses. The village carpenter knew how to make them. Built to last for generations, pukka houses were massive and appeared stable.

The houses as classified by function were unchanged. The three functions were the men's house and sitting room where male guests were entertained (*baithak*), the women's house (*ghar*), and the cattle shed (*gher*). Buildings that served combinations of these functions were common: a single building for men and women, for men and cattle, for women and cattle (relatively rare), for all three together, as well as separate buildings for each purpose. A few families had small stores, usually as part of the family dwelling. Families often owned two or more buildings, sometimes located at a distance from each other.

Older men in the 1970s dressed chiefly in the common fashion of the 1950s: dhoti (loincloth), shirt, turban, and *juti* (country shoes). Sweaters, scarfs, and quilts were added in winter. Younger men wore city-style clothing: trousers, shirts, and factory-made sandals, with sweaters and scarfs as needed. Synthetic fibers had become fashionable in the 1970s. Men with office jobs wore business suits in winter.

The *ghaghri* (full skirt), worn with a shirt and headcloth, was a common older woman's garment in the 1950s. The *ghaghri* was seen much less frequently in the 1970s. Younger women in the 1950s commonly wore baggy trousers (*salwar*), a long shirt (*kurta*), and headcloth. Most women of all ages wore this costume in the 1970s. Sweaters and scarfs complemented the *salwar* outfit in winter. Some teenage girls wore jeans and long shirts, to the disapproval of older conservative men. Women wore saris mainly on ceremonial occasions. Village costume seemed more varied and colorful in the 1970s than in the 1950s, although such impressions can be tricky. The old-style *ghaghri* was certainly a colorful garment.

Despite strong governmental efforts to slow drastically and possibly even to halt population growth through a program of family planning and sterilization, the population of Shanti Nagar increased 65.7% in the 19.5 years that separated our census of the 1950s from that of the 1970s. In 1958–1959, the population totaled 799 persons of whom 392 were females and 407 were males. In 1977–1978, there were 629 females and 695 males for a total of 1324 persons. The intercensal population increase was 525 persons. Families had grown in number from 110 in the 1950s to 176 in the 1970s (S. Freed and R. Freed, 1985: 236–240).

TABLE 1.

POPULATION OF SHANTI NAGAR BY CASTE IN
1958–1959 AND 1977–1978

CASTE	1958–1959	1977–1978
Bairagi Mendicant	27	48
Baniya Merchant	6	13
Brahman Priest	187	319
Chamar Leatherworker	98	188
Chhipi Dyer	5	7
Chuhra Sweeper	96	140
Gola Potter	58	125
Jat Farmer	260	385
Jhinvar Watercarrier	13	21
Khati Carpenter	0	3
Lohar Blacksmith	11	23
Mahar Potter	3	1
Mali Gardener	10	7
Nai Barber	25	44
Total	799	1324

The average age of the population was a year older in the 1970s, with a mean age of 22.5 years as opposed to 21.5 years in the 1950s. In the 1950s, the average age of females was three months less than that of males; however, in 1977–1978, females were, on the average, three months older than males. The sex ratio, which is the number of males per 100 females, increased during the intercensal period; it was 103.8 in the 1950s and 110.5 in the 1970s (S. Freed and R. Freed, 1985: 237, tables 1, 2). The sex ratio found in Shanti Nagar has characterized India, especially North India, for as long as census information is available (Wood and Maconachie, 1882: 91, 93, table 1; Visaria and Visaria, 1981: table 2, 1733). The anomalous deficit of females suggests the practice of female infanticide, sometimes by abrupt action but perhaps more commonly nowadays through neglect, such as the withholding of medical care. A modern variant of female infanticide is female feticide after a prenatal test to determine the sex of the fetus. The Government of India and various state governments have taken legal steps, largely ineffectual, to deal with this problem (R. Freed and S. Freed, 1993: 37–43; Miller, 2001: 1089).

The roster of castes and their relative sizes did not change in the intercensal period, save for the immigration of a family of Khati Carpenters (table 1). Of the five largest castes, the Brahman Priests and Jat Farmers are categorized as high castes. They are the wealthiest and best educated of the castes and own almost all the village land. The other three large castes, the Gola Potters, Chamar Leatherworkers, and Chuhra Sweepers are designated as low castes. The high-low classification masks considerable differences of rank among these castes in the traditional hierarchy. The Brahmins, at the top of the hierarchy, rank well above the Jats. The Gola Potters, are firmly entrenched above the Chamars. The Chamars and Chuhras are scheduled castes, that

is, Harijans, but the Chamars are solidly placed above the Chuhras, who are at the bottom (S. Freed, 1963b, table 4). The Jats dominate the village politically because of their numbers and landholdings, but must look to the votes of the lower castes to retain official political power, for the village council (panchayat) is now elected by universal adult suffrage and secret ballot (S. Freed and R. Freed, 1987). Although the hierarchical aspect of caste has been undermined to some extent by the educational and occupational opportunities of modern times, castes retain their importance. Family, caste, and village are still the principal institutions that have to be taken into account to understand life in rural India.

FIELDWORK, 1957–1959

It has been over 25 years since we published a record of how we came to Shanti Nagar in the 1950s, our living arrangements in the village, and our methods of fieldwork. Reviewers have pointed out that this information should be included here in order that the current volume stand alone. Another reason for presenting a shortened version of the account originally published in S. Freed and R. Freed (1976: 17–28) is that most of it was relevant to our work in the 1970s. Our life in the village did not change very much between fieldtrips; our methods of fieldwork, even less so. Ethnographic fieldwork is based on observation, interviews, the notebook, and the camera. Audio or video cassettes are useful adjuncts, and we tried them in the 1970s, but the notebook is indispensable.

People occasionally have asked us how we managed to collect so much data. There are probably many reasons, but field experience prior to our work in India—several months among the Washoe and a few weeks with the Mohave—strikes us as especially important. Because of our previous field research, we had some idea of how to go about fieldwork: what to expect, how to begin, how to observe and interview, how to divide our work efficiently, and a sense of the information that would be necessary for fully describing an event or an activity. Above all else, however, we believe that our field situation was ideal. We enjoyed the hospitality, cooperation, and friendship of the people of Shanti Nagar from the first day.

We arrived in Delhi early in November 1957, and began to search for a village in which to study the effects of urbanization. We wanted a village close enough to Delhi to provide employment opportunities for the villagers and yet distant enough to retain its village character. We also preferred a village at some distance from a main road, because we did not want to contend with the complication of roadside shops. Other characteristics that we considered important were caste composition and population size. We sought a village with a roster of castes fairly typical of the region and a population of about 750 inhabitants, which we thought was about as large a village as we could study adequately in some 17 months.

The selection of the village and our entrance into it were greatly facilitated by the Department of Community Development of the Union Territory of Delhi then headed by Dr. J. C. Ramchandani. With our needs in mind, officials of the Department contacted the leading men in potentially suitable villages to determine if our presence would be acceptable. Several villages apparently agreed to accept us. Some

of the younger officers took us to visit these villages so that we could make a final selection. At least we thought that we were making a selection. What actually happened, we later learned, was that the Community Development people, while tactfully maintaining the illusion that we were making the choice, had settled on one village as the most suitable and had arranged matters so that we would almost certainly "select" that village.

In the first village that we visited, the house made available to us was rather depressing by the standards of well-to-do villagers. Also the village itself was not particularly attractive. The available housing in the second village was similarly poor. The third and last village that we were shown, Shanti Nagar, was not only attractive with pleasant lanes and a fair number of shade trees, but also permitted us the choice of three houses that were especially well built and comfortable. Although the people in the first two villages had paid relatively little attention to us, the people of Shanti Nagar swarmed to greet us, showed us the three available houses, and offered us warm milk, the token of village hospitality. We expressed our preference for Shanti Nagar, and the Community Development people congratulated us on the wisdom of our choice.

Several months later, one of the men of Shanti Nagar told us that Community Development officials had held a meeting of leading men from a number of neighboring villages to ask them if they would be willing to have an American couple living in their village to study its daily life. Shanti Nagar was interested in us, and that is how we came to "select" it.

Our accommodations in Shanti Nagar were on the second floor of a solidly constructed brick house belonging to a member of the Brahman Priest caste. For our purposes, the house was ideally situated: It was almost in the center of the village, directly on the line between the separate residential areas of the high and low castes. Because our apartment was on the second story, we could see much of the village when standing on the roof outside our door and, most significantly, the courtyard of the Jat Farmer community house (*chopal*) where important meetings were usually held. Thus, we could observe crowds gathering for meetings and ceremonies. We could also hear major disputes when they erupted and hurry to the action. To have been even 100 yards from the village would have meant missing many events.

Our landlord, who became our friend and principal sponsor, made all our living arrangements in the village. He knew that a bathing room and latrine would add greatly to our comfort and convenience and went to the expense of constructing two outside rooms for these purposes. He arranged for a watercarrier and sweeper, both essential, and also found accommodations for our male interpreter. Our landlord received us into his family as fictive relatives at no little inconvenience, for we occupied half of his house, and his large family was crowded into the rooms on the lower floor.

Our apartment had three rooms exclusive of bath and latrine. We used a large central room for cooking, eating, and receiving guests. On either side of this central room were two smaller rooms. One was our bedroom and office; the other was where our female interpreter lived. At that time, Shanti Nagar lacked electricity and running water. In one way, this was an advantage. Because the walls of our house had no openings for pipes or wires, we were able to keep out rats, as well as mosquitoes

and flies, simply by putting screens on the doors and windows (there was no glass in them) and plugging the holes left at the bottom of walls to drain off water. The arrangement of our rooms was definitely not Indian. The better-off villagers, into whose ranks we fell, generally separated the quarters of men and women, and their cooking was not done in the sitting room.

Our style of life was a mixture of Indian and American practices. We cooked on kerosene stoves using Western-style utensils, including pressure cookers. All the villagers cooked over fires of wood and coddling cakes with traditional griddles and brass pots. For breakfast we generally made pancakes, with wheat flour, sugar, and buttermilk, fried in vegetable oil. This approximated the Indian pancake, *malpura*; it was the only dish we cooked that the villagers liked. The rest of our diet consisted of local vegetables, rice, and lentils cooked in oil with spices, milk, curd, and a variety of Western-style commodities, all obtained in Delhi: leavened bread (double *roti*), tinned biscuits, coffee, tea, jam, and peanut butter. The only advantage of this diet was that we could quickly prepare meals. Indian cooking is time-consuming, requiring skills that cannot be learned overnight.

Out of respect for our landlord and the villagers, our diet was vegetarian. This meant a menu consisting of grains, vegetables, lentils, fruits, and milk products. Some lower-caste villagers ate meat and a few upper-caste men also ate meat on visits to Delhi; but most villagers were vegetarians and the upper castes were generally quite strict about it. We ate three meals a day the year round, rather than three meals during summer and two in winter, as did most villagers. We ate at a table and sat on chairs rather than on a cot or on the floor; we used flatware instead of our fingers; and we ate together, not separately as did village husbands and wives. Eating together attracted a good deal of attention and amused comment, and we found it unnerving to have people visit us just to watch us eat. After a few months, we asked people to sit outside until we had finished our meal, and they cheerfully complied.

We lived in Shanti Nagar for 13 months from January 1, 1958, to early February 1959. For the first two months, we were chiefly occupied with becoming accustomed to the village, recording everything that we observed, and, perhaps most importantly, giving the villagers a chance to get used to us. We were a great curiosity; the villagers spent much more time questioning us than we did them. There were people in our house from sunrise until late evening. Although being constantly with strangers is difficult for Westerners who are accustomed to considerable privacy in their homes, we were delighted with the attention, for it indicated a real interest in us and, as it turned out, the acceptance of our activities in the village.

The circumstances of our entry into Shanti Nagar under governmental auspices and at the invitation of the leading men of the village greatly eased our way. We did not have to go through a difficult period of penetrating a wall of indifference, suspicion, and hostility. We sometimes did encounter such attitudes, but generally people were friendly and cooperative. In fact, the villagers acted as it were a matter of village honor that we be properly treated. We were protected from exploitation and overcharging, and nothing of value was ever stolen from us. When we attended ceremonies, especially those out of the village, the people of Shanti Nagar made sure that we were well treated and prevented us from doing anything gauche.

We found, at times, that some people quietly and intelligently worked behind our backs to assist us. One extremely perceptive young man, noting after a few weeks of our residence that we were spending almost all our time with people of high caste, decided to break this pattern. Although himself a member of a high caste, he arranged for us to be invited to a low-caste wedding, where we were offered and accepted food, something that a high-caste person did not do in the village at that time. Our act caused a sensation. Some high-caste individuals told us that their relations with us could never again be the same; a few people altered their behavior toward us. However, everything returned to normal in a few days. The man who instigated the affair remained calm throughout, simply remarking that, "Formerly you were people of the high castes; now you are people of the whole village." After a while, we stopped worrying about foreseeing and coping with difficulties in interpersonal relations. In this area, the villagers were expert and usually could be trusted to do what was necessary, and indirectly to instruct us.

After the initial two- or three-month period of adjustment, the villagers' curiosity concerning us gradually diminished and we were able to move about without attracting too much attention. We then began systematic interviewing. During this period, which lasted six or seven months, we took a village census and recorded information for the ethnography of the village. This part of our fieldwork fell mainly in the hot season, officially from May 15 until the beginning of the monsoon early in July, and the monsoon season itself which lasts into September. The area around Delhi is uncomfortably hot early in May and by the 15th an unrelieved wall of fire settles over the region. Villagers find the hot season uncomfortable; Westerners find it murderous. Some of the villagers thought that we would surely go to a hill station in this season as was the British custom during the Raj and still is the practice of anyone with enough time and money. They were rather pleased that we did not.

During the last four or five months of fieldwork in Shanti Nagar, we continued to add ethnographic information, but our major emphasis shifted to questionnaires and surveys to gather qualitative and quantitative data on a variety of topics: for example, caste ranking, fictive kinship, houses, land, animals, shrines, agricultural and household implements, and the various crop rotations and costs. This part of our fieldwork was carried out in the most pleasant time of the year, the fall and winter; about half of it coincided with the best time for fieldwork in north Indian villages, the season when sugarcane was being harvested and crushed. Sugarcane was crushed at a number of presses situated only a few steps from the village habitation site. There men could be found who had plenty of time to talk, for in sugarcane crushing, periods of rather intense activity alternated with periods of leisure.

Early in February, we shifted our primary residence to Delhi where for four months we interviewed people from Shanti Nagar who had moved to Delhi either permanently or temporarily. We also systematically read over our fieldnotes looking for gaps, weaknesses, and ambiguities in our information. This task was best accomplished in Delhi where we had relatively few visitors during the day rather than in the village where we had little time to ourselves. However, we continued to maintain our village residence and made frequent trips there principally to attend ceremonies and to gather information on subjects that were not clear in our notes. People from the

village often visited our Delhi apartment. Some of our most fruitful interviews with villagers took place in Delhi where we were removed from the distractions of relatives and bystanders that almost always accompanied interviewing in the village.

Our interviews were carried out through interpreters except when talking to the 14 or so men of the village who spoke English reasonable well. We had taken a short course in Hindi before going to India, and during the first few months of residence in Shanti Nagar we attempted to improve our facility. However, we did not progress rapidly enough, so it became clear that further investment of time and effort in language-learning would be inefficient. Because we had extremely able interpreters, we believed that we could use our limited time in India most effectively by working through them.

We have mentioned that we did not at the beginning of our fieldwork experience a period of severe suspicion and hostility, principally because we entered with governmental assistance and at the invitation of the villagers. However, two additional important factors contributed to our acceptability: first, the traditional courtesy and hospitality of the north Indian villager, and second, the fact that we were husband and wife. A husband-wife team is more readily accepted in Indian villages than a single person of either sex, probably because the married state is the normal one for adults. The villagers regarded unmarried adults, especially young ones, as potentially disruptive.

The chief advantage that a professional wife and husband enjoy in fieldwork is that they can divide the research and achieve considerably more coverage than either could accomplish alone. Mead (1970: 253) commented that when a husband-and-wife team work together successfully, "the adequacy of the material is multiplied not be a factor of two but something more like a factor of five. . . ." A few decades ago, most ethnography was heavily male-centered because most ethnographers and most informants were men (Berreman, 1968: 348). A wife and husband can minimize this bias because the former will be able to work with women and her presence will make it easier for her husband to do so. At all-village festivals, more than one observer was especially helpful. Different castes had somewhat different practices, and it was important to survey as widely as possible.

We differed from many other fieldworkers in Indian villages in not providing medical aid to the villagers. Such assistance has often been a conspicuous part of the reciprocity between ethnographer and villagers. Our reluctance to provide medicines was based on the obvious fact that a person who is medically uninformed can do damage by prescribing the wrong remedy. Furthermore, considerable medical aid was readily available locally. A number of Ayurvedic physicians were close by in another village, and Western-style medical facilities were available in Delhi both privately as well as under India's national program of medical care.

Reciprocity in our case consisted mainly, we believe, in the novelty provided by our presence. Most villagers were curious about Americans: the United States was much in the news; relations between India and America were good; we had established our residence in the village where villagers could observe most of our activities; and there was no serious communication barrier. Possibly also there was some enhancement of prestige because foreigners were living in the village. In summary, we were in the right place at the right time.

RETURN TO SHANTI NAGAR

We returned to Delhi in early September 1977, 20 years after the beginning of our first sojourn in India. We expected the second trip to be less difficult than the first one, and in many ways it was. The trip to India, for example, was by jet plane rather than by freighter and train, 24 hours as compared to six weeks. We were better financed the second time, which was a great blessing. We were represented in India by the American Institute for Indian Studies, whose extremely capable staff took care of many details of dealing with the Government that are a problem for foreigners. Our affiliation with the University of Delhi had been arranged before our arrival. The difficult problem of finding a village for fieldwork was no factor, for we would return to Shanti Nagar and live in the same quarters as in the 1950s. Friends in Delhi found assistants for us, and we were back in the village one month after our arrival. In the 1950s, similar arrangements took two months. To find a village and settle into it in two months is fast work; one month is close to the minimum if one has to buy furniture, bedding, and make some minor changes in one's accommodations. The common village bed (*palang*) and bedding are not purchased ready-made but are ordered from artisans. In 1977, our baggage and furniture went to Shanti Nagar by pickup truck. In 1957, we used a bullock cart.

The first day back in the village was exhausting. Many people came to see us from the moment of our arrival, and we had to unpack and organize while trying to greet and talk to old friends. Toward evening, we managed to take a walk in the fields to have a little rest from all the commotion. At the invitation of a farmer, we sat down beside his tubewell. We talked of this and that, and then unexpectedly he commented, "When you were here last, there were many trees in the fields. Now they have all been cut down." We shall discuss later why this was so. At the time, however, we were impressed by how well a villager remembered what we saw and did during our first trip. Many other villagers recalled various events of our first trip, and their memories were of value when we asked them to compare the village of the 1970s with how it was when we lived there in the 1950s.

One of our first-day impressions, soon corrected, was that the village was seedier than formerly. To reach our apartment, we had to pass the house of one of the village leaders of 20 years earlier. The house was in noticeable disrepair, but we quickly learned that the condition reflected only the fortunes of the head of the household and not the rest of the village. In fact, the village was much more prosperous and modern in 1977–1978 than in 1958–1959. It had a more imposing look, for houses formerly made of dried chunks of mud had almost entirely been replaced by structures of brick. Moreover, there were more houses than formerly, and the habitation area had been enlarged to accommodate a population increase of 66%. The compact nature of Shanti Nagar with its houses crowded together, sometimes sharing one or more walls with adjacent houses, is a common type of north Indian village, often designated as nucleated. The compact habitation site is bordered by undivided village common land. Beyond this tract lie the cultivated fields. The village habitation site may expand by encroaching on adjacent common land. A village can also accommodate more people by enlarging houses, generally by adding a story. In the Shanti Nagar region, it is forbidden by law to build houses in the cultivated fields.

Another early impression, all too accurate, was that most of the older generation of the 1950s were dead. The day after our arrival, we were walking along the main lane when an elderly woman asked us into her house to greet a once important elderly man whom we had known in the 1950s. He was dying, but he stirred himself to smile and welcome us. Later the same day we chanced on another elderly man resting on a cot. Although feeble, he sat up to greet us. Some of our best informants were among the missing, especially our landlord's late mother. We saw her every day during our first visit. She was always great company and full of reliable information about the village. Another of our best informants, a man who had visited almost daily, was also no longer available although still alive. He lived on a farm at some distance from Shanti Nagar. We were sure that he would return home for a visit to see us, but he never did. Most likely, a family tragedy kept him away from Shanti Nagar. We greatly missed all these people.

Our style of life in the 1970s closely resembled that of the 1950s. Of course, there were some differences. We had a cook in the 1970s, who saved us no end of time and energy. A cook is almost a necessity for foreigners in India. Electricity was another convenience lacking in the 1950s. We no longer had to deal with kerosene lanterns, had a refrigerator, and could use our electric typewriter. Our bedroom had ceiling fans. Heat can be almost unbearable in North India, and ceiling fans are a relief. They also keep mosquitoes away. Although we had metal screens installed in our windows, mosquitoes could still enter.

Adults did not find us quite the curiosity in the 1970s that we were in the 1950s. People still came regularly to see us, often more visitors than we could manage, and almost invariably welcomed us when we visited for an interview, but they were no longer interested in watching us eat, for example. Modern communications had made the world smaller, people were better educated and more sophisticated, and many Westerners passed through Delhi. Moreover, a French couple had lived in the village for a few months. We learned little about their activities other than that they seemed more interested in experiencing village culture than in doing fieldwork.

As on the first trip, children could still be a significant nuisance, often following us about, mobbing us, and sometimes making enough commotion so that interviews were impossible and householders were annoyed. There was a slight but noticeable decline of manners among the children and adolescents. It was a general feature of Indian life, even rural life, but it also affected us from time to time. There were several teenagers in the village who were nothing but trouble. After one brief unpleasant episode, we wrote in our notes, "There simply is no question that children and teenagers cannot be controlled nearly so much as formerly. Adults other than family members can do relatively little, and authority even in the family is weaker than formerly."

The features of Western life that were of greatest interest to villagers, certainly to young men, had changed markedly. The hippies (both American and European) who were highly visible in Delhi had with little doubt created an unfortunate impression. We once were sitting and talking with three young men on the outskirts of the village. An older Jat man and his wife, who was a fictive *bhabhi* (older brother's wife) of the young men, arrived and sat down. (See S. Freed, 1963a, for a discussion of fic-

tive kinship.) The long discussion that developed concerned principally sex, drinking, smoking, and marriage in America. The woman was a leader in the sexually suggestive joking, permissible behavior in view of the traditional joking relationship of an older brother's wife and a husband's younger brother. After the session, we wrote in our notes,

We were struck by what seems to be a change in the interests of the villagers. The last time we were here, some of the principal topics of conversation when the villagers asked about America were the treatment of cows, the eating of beef, and the treatment of old people. Now people rarely mention these topics. Instead they are concerned with marriage and courtship, smoking, and drinking. Their picture of the Westerner is clearly that of a hedonistic, uncontrolled individual. The thought seems both to repel and attract them. These young men mentioned the Westerners they see in Connaught Place. They said that the women all drink and smoke. We said that these are strange people, but they pointed out that drinking and smoking at least are common behavior. They said that 50 percent of American women drink and smoke.

Different contexts and the people who are present during interviews on the same subject can affect how they develop. The young men above who questioned us were interested in sexual activity and mild, common vices—drinking and smoking. Suggestive sexual joking ran through the interview, chiefly because an “older brother's wife” was present. A comparable interview in another context with older people evolved differently. One of the subjects, marriage customs, was the same but the tone was different: a lively but rather staid interest in societal differences as opposed to sexual titillation in the preceding interview.

The latter interview took place shortly after the death of the 25-year-son of Mr. and Mrs. Patriarch, a well-liked Jat couple. He died after an illness of five days (R. Freed and S. Freed, 1993: 282). We were on our way to the fields late one afternoon early in April and, as we passed the Patriarchs' house, a Brahman man indicated that we should go inside. We suddenly realized that we had not paid a condolence call on the Patriarchs. We entered. Six women were sitting around talking. One young woman was very talkative, which was a big help. We remarked that the death was the will of God, a common remark intended to comfort mourners. The young woman then began to describe the illness and the events leading to the death. She added no new information, and after about 10 minutes we left and went to the mens' sitting house.

Several men were inside when we arrived and there was a certain amount of coming and going during the more than an hour that we stayed. Mr. Patriarch was taking the death very hard. We expressed our sympathy and then sat silently. We did not know what to say and, in any case, we wanted one of the men, all senior, to take the conversational lead. One of the men present was a middle-aged Jat who always made situations difficult, and another Jat, whose presence was never a help, was in and out a couple of times. Fortunately, another Jat man, very intelligent, a good talker, and an excellent interviewer, began to ask us about America. We made no effort to change the subject, for it was apparent that Mr. Patriarch was enjoying the talk

and was being distracted from his grief. We talked about insurance, crime, American villages, and marriage customs—except for insurance, the usual topics about which people asked us. It turned out that insurance was much on peoples' minds because a Jat man had recently been killed in an traffic accident. A truck collided with the vehicle in which he was riding. The truck was insured, and the victim's family was suing the insurance company. When we left, Mr. Patriarch thanked us, very sincerely we thought, for having visited him to express our sympathy and he added that the conversation and laughter had distracted him and been good for him.

Drunken village men could make fieldwork difficult on holidays and Sundays, days of leisure especially for urban workers. Men who liked to drink had the time to do so. A few drunks circulating in the village carried the potential for unpleasant confrontations. Diwali, the Festival of Lights, was a case in point. Before the lovely display of lamps in the evening, the day had been most difficult. As we were walking past a *baithak*, a drunken man called us. When we entered the room, we could see that he was aggressive and that the situation would be unpleasant. A number of boys and men were standing around grinning and waiting to see what would happen. We immediately sent our young female assistant back to our house. The man talked to us for about five minutes in his usually aggressive manner when drunk. Then we were able to leave in reasonably pleasant circumstances. We knew the man well and, while somewhat surprised and definitely annoyed, were not particularly disturbed. When sober, which was most of the time, he was pleasant enough, intelligent, and could be a good informant. Villagers did not regard him as dangerous. When drunk, "... he just barks and says many things," they said, in contrast to another notorious drinker who they said should be avoided.

As is always true of events in a tight-knit village, news of the incident spread like wildfire. Villagers interpreted it as a gratuitous insult to our young unmarried assistant, who was a fictive "daughter" of the village. Daughters are not casually insulted in North Indian villages. Later in the evening, the *pradhan* (head of the village council), an old friend, came to inquire about the incident. We assured him that there really had been no problem. He remarked, perhaps to even accounts, that during the Second World War, American soldiers had followed Indian women. We responded that soldiers of all countries often acted like that, but we also apologized for their behavior. The *pradhan* appreciated our tact, and the discussion was very friendly.

Although we had to be in the village on festival days, we thought that it might be a good idea to avoid Sundays as much as possible. Not only was drinking a problem, but also out-of-towners, many of whom were originally from the village but currently lived elsewhere, came to the village to visit relatives. It was next to impossible to conduct a useful interview with visitors hanging around. Because we as well as our assistants needed regular time off, we generally went to Delhi on Sundays and returned to the village Tuesday mornings. Monday was our day for shopping and taking care of other business in Delhi, and our assistants could visit relatives and friends.

A number of social and economic developments in the interval between our two periods of research in Shanti Nagar improved the economic circumstances and general well-being of most village families. Among them were a much higher educational level (table 2), improved health services, a substantial increase in salaried urban occu-

pations, the mechanization of agriculture, the growth of highly profitable vegetable farming, daily delivery of newspapers, and the conveniences and pleasures that accompany electricity. Wheat could be ground in electrically powered mills, and fodder chopped by motorized fodder cutters, both of which lightened the workload of women, although most women still ground wheat in a hand mill and chopped fodder with a hand-operated mechanical fodder cutter. Radios were commonplace, there were a few television sets, and some people had ceiling fans. Two men owned automobiles.

There were far fewer rats in the 1970s than in the 1950s, for brick houses and cement floors offered a less favorable environment for them than did mud houses. The swarms of houseflies common in the 1950s had lessened in the 1970s, perhaps because farmers had almost entirely abandoned the cultivation of sugarcane. During the crushing season in the 1950s, sugarcane juice would splash on the voluminous skirts that many women wore, which attracted an abundance of flies. When such a woman entered a house, so did the clinging flies.

Malaria had staged a comeback and typhoid was a problem. After an effective governmental campaign using powerful insecticides had almost eliminated malaria in the Delhi region in the early 1960s, by 1965 it had come roaring back. *Anopheles* mosquitoes had developed resistance to insecticides. Increased irrigation from tube-wells and canals resulted in more standing water in the fields as potential breeding sites for mosquitoes. The explosive growth of handpumps added to the surface water in the village and on its outskirts. From 1974 to 1978, malaria was present in epidemic proportions. The years 1977 and 1978 marked the highest incidence of malaria in the Delhi region to that date (W. Peters, 1975; Sarkad, 1975; Pattanayak and Roy, 1980: 1, 5–6, table 1). *The Indian Express* (April 19, 1978: 3) reported that “Delhi citizens are in for a worst form of malaria epidemic this year. . . . As many as 33,296 positive cases of malaria have been detected . . . from January to March this year as against only 5389 cases for the corresponding period last year.”

The Government fought the epidemic in the countryside by organizing the distribution of chloroquine tablets by an assortment of governmental and volunteer workers. The village *pradhan* distributed tablets from the beginning of the hot season in April until November. Villagers also went to clinics in a large nearby village for tablets. The recurrence and rise in the incidence of malaria from 1965 to epidemic proportions from 1974 to 1978 hit the people of Shanti Nagar hard. As if malaria were not enough, the prolonged monsoon of 1977, which left large flooded areas around Shanti Nagar even two or three months after the end of the monsoon season, helped to cause an outbreak of typhoid. The bacterium that causes typhoid enters the body through the mouth. The village water supply is unprotected and easily contaminated, especially during the rainy season.

Educational and economic development combined with population increase and a dearth of employment were probably behind the astonishing number of people who expressed a desire to go to America with us, either for a visit or permanently. We encountered next to none of that in our first field trip. At first we thought that people were joking, but it became clear that most were in earnest. A few men asked about the cost of a visit. Women more often than men said that they wanted to go, perhaps because to them America represented relative freedom from drudgery. Children did

TABLE 2.

**EDUCATION (YEARS) BY GENDER, CASTE, AND AGE,
1958-1959 AND 1977-1978**

	YEARS OF SCHOOL			
	1958-1959		1977-1978	
	NUMBER	AVERAGE	NUMBER	AVERAGE
Men				
Caste				
High	194	4.53	370	7.23
Low	101	2.45	199	5.62
Age (years)				
6-17	123	4.58	233	5.51
18-39	97	4.72	214	9.84
40 and older	75	1.39	122	3.29
Total men	295	3.82	569	6.66
Women				
Caste				
High	190	0.96	324	3.82
Low	91	0.27	195	1.68
Age (years)				
6-17	114	1.24	198	3.98
18-39	106	0.54	193	3.79
40 and older	61	0.12	128	0.36
Total women	281	0.73	519	3.02
Men and woman				
Caste				
High	384	2.76	694	5.64
Low	192	1.42	394	3.67
Age (years)				
6-17	237	2.97	431	4.81
18-39	203	2.54	407	6.97
40 and older	136	0.82	250	1.79
Total men and women	576	2.31	1088	4.92

The population consists of all village residents six years of age and older. Degrees and credentials were converted to years of study: For example, the B.A. required 3 years of study past the higher secondary level (11 years), that is 14 years. The M.A. added another 2 years, a total of 16 years. A person who had not attended school but had taken an adult education course and/or claimed to be literate was scored as 1 year of schooling.

not ask about making the trip, but a mother would indicate a child and say to us, "Take this one with you." One boy who was frequently in our house, in part at the instigation of his father, reported that his father told him to go to America with us because his family had no job for him and not enough land to provide for the many sons who would inherit.

We thought that we suffered less illness during the second trip. It was only after returning to New York when we had a chance to read through our notes that we realized the toll that illness had taken, not only on us but also on our assistants. Hepatitis and intestinal maladies troubled us during the first trip, but during the second trip, we were able to avoid hepatitis, and intestinal troubles were considerably reduced. Instead, respiratory illness was the major problem. The villagers themselves expected colds and fever in the winter. In the densely populated village and crowded Delhi, there was no escaping them. Our assistants were not spared. All of them were repeatedly sick and sometimes out of action for up to a week. In addition, one assistant was bitten by a dog and missed several days. Another was badly shaken by the suicide of a friend and took some time off. By mid-January, we noted that health had become a serious problem, not that any of the illnesses (aside from an episode of food poisoning) was particularly dangerous but that the work routine was badly upset. In fact, it became a rarity to have all our assistants available in the village at one time.

Nonetheless, the collection of data exceeded our most optimistic expectations, a result due in no small measure to the fact that we had previously worked in Shanti Nagar. The data collected in 1977–1978 immediately fell into context and much of them, such as census information, could be checked by comparing them with our earlier census. That we had such control over the validity of data gave us the option of delegating some routine interviewing to assistants. This step was necessary in any case because the village had grown to such a size that the completion of our project in only 30 weeks required more than two people. The work of our assistants was checked on a daily basis, and anything that was in conflict with data from our earlier trip, with our own interviews or observations, or appeared otherwise dubious was corrected by additional interviewing.

THE GREEN REVOLUTION

In the mid-1960s, rural India passed through a period of rapid social and technological change. Because changes were especially evident in agriculture, the period is known as the Green Revolution. Although all of India was affected, the Green Revolution was particularly pronounced in the northwest: Punjab, Haryana, Delhi Union Territory, and western Uttar Pradesh. By the late 1970s, the Green Revolution had been adopted throughout its northwestern heartland, and this region had entered the post-Green Revolutionary period.

The two periods show significant differences, among which were a spectacular increase in the growth rate of grain production during the Green Revolution followed by a decline in its rate of growth afterward; the squeezing of farmers between uncontrolled costs of production and the controlled prices of basic grains as the Green Revolution ran its course; and the hazards involved in the shift from basically subsistence

farming at a low technological level to expensive capitalistic farming with modern technology. We collected extensive data in the course of two field trips, the first in 1957–1959 and the second in 1977–1978. The dates of the two studies straddle the Green Revolution, a circumstance which makes possible detailed comparison of village life before and after this agricultural and social transition.

Two phases in the adoption of the Green Revolution have been distinguished. Initially, the Green Revolution was a biochemical revolution featuring new seeds, factory fertilizers, and irrigation. The second phase saw the introduction of power-driven equipment, most notably tractors and threshers (Bhalla, 1989: WS-67). We were not in India from the mid-1960s to the mid-1970s and do not know if this sequence characterized the Green Revolution in Delhi Union Territory. If it did, the later phase probably followed the earlier one very quickly and most likely the two phases were effectively conjoined, their separation being more for analytical purposes than a clear historical reality (Basant, 1987a: 1298). In any case, by the time that we arrived in Shanti Nagar, all aspects of the Green Revolution were in place, and we treat it as a unitary phenomenon.

Five major sociotechnological innovations were basic to the Green Revolution: the development of high-yielding varieties of food grains, especially wheat and rice; land consolidation; private tubewell irrigation; mechanization; and the use of factory fertilizers and pesticides. The most visible results of the Green Revolution were substantially increased production from the new grains, usually two or three times the yield of the traditional varieties, and greater prosperity for farmers. Most commentators on the Green Revolution focus on these agricultural aspects. However, there were developments in education and employment at the same time. Although not usually designated as a revolution, advances in education and new sources of employment have produced profound changes in social relations. In our view, the social revolution that has accompanied the introduction of the new agricultural technology has been just as important as the increased agricultural production prominently featured as the heart of the Green Revolution.

This monograph is the 11th in a series devoted to the study of life in Shanti Nagar (a pseudonym). Like the other monographs in the series, it offers both detailed ethnography, with considerable narration of specific events, and an analysis of change. It focuses chiefly on economics and technology in the 1970s as compared to the 1950s. However, related developments in social structure and education are also part of the Green Revolution in its broad sense and must be taken into account in order to present as complete a picture as possible of change and stability in village life over a period of 20 years. They cannot be included in this report but will be taken up in our next monograph. Some important trends in demography, education, innovations in politics, and changes in ceremonial life are not described here, having been treated extensively in earlier monographs (R. Freed and S. Freed, 1979, 1980, and 1981 on sickness, rites of passage, and education respectively, and S. Freed and R. Freed, 1985, 1987, 1998 on population, politics, and the yearly cycle of festivals).

Our first study was carried out only a decade after Indian Independence (1947), a watershed event that, with massive immigration from Punjab, transformed Delhi, a rather quiet colonial city, into a huge administrative, commercial, industrial, edu-

cational, and recreational center. Today, Delhi is one of India's four megacities (Bombay [now Mumbai], Calcutta, and Madras [now Chennai] are the others), places with more than five million inhabitants (Nath, 1991: 2937). The years following Independence were a period of strong influences emanating from Delhi, as the Government passed legislation and designed programs intended to change, even revolutionize, village life economically, technologically, and socially. In addition, the vocational, educational, and recreational opportunities available in Delhi, a city then experiencing rapid modernization and westernization, were as effective as governmental programs in effecting change.

Panchanadikar and Panchanadikar (1978: 5–6) note that the term modernization has replaced westernization. The former term indicates more diverse origins of cultural influence, such as Japan. However they acknowledge that modernization has led to Western-style social systems. There is no question that modernization in India is overwhelmingly westernization, which means in the Indian context that the two terms are largely interchangeable. Of more importance than the slight difference between modernization and westernization is the fact that new developments and programs, from whatever source—internal or external—are shaped by the existing culture and can lead to different results in different societies. An example is the differing course of land consolidation in India and France, as we shall see below.

Although change constantly takes place, the importance of specific changes and the rate of change can vary drastically. For example, the plow used in the 1950s had been introduced in the preceding 30 or so years. Both the older plow and its replacement were simple bullock-drawn wooden implements with an iron share, but the new plow was designed somewhat differently and was said to be easier to use. In comparison with the changes that cascaded through diverse aspects of village life when tractors became widely used, the slight modification in the design of the wooden plow was a trivial development narrowly restricted to a single agricultural operation. As for the rate of change, Indian Independence and later the Green Revolution each gave a huge impetus to change. The rate of change in the first half of the 20th century was slow in comparison with the transformation that began in the 1950s just after Independence. In the mid-1960s, the Green Revolution, beyond its major rapid agricultural effects, accelerated trends in social relations that were already clear although moving rather slowly.

An emphasis on change should not obscure the basic stability of village life. The village was not overwhelmed either by modern technology, aggressive governmental intervention, or more passive urban influences. It was a well-integrated social unit whose people had the capacity to adopt selectively those innovations considered to be useful and to reject those perceived as disruptive even when the latter were buttressed by the force of law. Some of the most potentially disruptive legislation concerning inheritance and land reform was largely ignored, the villagers confidently expecting that the Government did not intend implementation and certainly not rigorous enforcement (cf. Shanin, 1971b: 258). Religious belief, ceremonial, and family life were relatively unaffected as compared to technology and economics. Politics and village governance had changed, and yet, from a skeptical point of view, the changes could be described as new ways of achieving traditional results (S. Freed and R. Freed, 1987: 69).

The usefulness of an ethnography is in direct proportion to the amount of well-organized detail that is presented, and we have not stinted in this regard. Such a presentation requires that a large complex picture be subdivided into comprehensible subsystems, with the associated danger that broad important features of the system fail to stand out from the background of detail. We are aware of the danger and try to avoid it as much as possible by occasional summaries in which the most important developments are highlighted.

Although we make little explicit mention of them, we have kept in mind the writings of various authors about peasant society, the folk-urban bipolar model, and peasantry as a specific type of economy. In our study of the 1950s, we were influenced, to some extent, by the bipolar model of the folk (peasant)-urban continuum. This model attempts to discover pairs of qualities that would serve to distinguish "urbanism as a way of life" from village life, the opposite pole of the rural-urban continuum (e.g., Redfield, 1941). Gulick (1973: 894) has compiled a roster of these qualities, such as, the village quality listed first, sacred-secular, simple-sophisticated, integrated-disintegrated, and stable-changing. Gulick called pairs of such characteristics the bipolar moralistic model. After Redfield's (1941) definitive anthropological treatment of the bipolar model, several decades of research and criticism have shown that it does not fit particular situations too well. Gulick suggested a list of alternate characteristics which, at least for Shanti Nagar, also do not work very well.

Despite its limited usefulness, the bipolar moralistic model did generate some hypotheses that we chose to explore in the 1950s study. For example, the belief that village society is "sacred" and urban society "secular" suggested the hypothesis that urban-influenced villagers would be less traditional in their religious and ceremonial lives than those who had been less exposed to urban influences. The hypothesis that village society is "integrated" and urban society "disintegrated" implied that the larger complex joint family might lose ground to the smaller simpler nuclear family. We found no evidence either for a secular trend in village life or for family breakdown (S. Freed and R. Freed, 1969, 1976: 12-14, 209-210).

By the 1970s, we had abandoned the bipolar model. It was simply too limited to offer any insight into the intricate nexus of economic links, laws, governmental programs, and communication that integrates Shanti Nagar into the region and nation, and connects it, to some extent, to the world economy. Equally important are village traditions, attitudes, and long-established customary law that allow Shanti Nagar to maintain considerable autonomy. It is not so much a smooth, insensible, coordinated displacement of behavior toward the urban pole, as evaluated by the vague, somewhat independent scales (sacred-secular, personal-impersonal, etc.) of the bipolar model, but rather a process of triage. Villagers accept useful innovations and reject ideas and programs regarded as dangerous. The process is not passive and largely unconscious but contentious. Villagers intensely appraise every program, searching for personal and village-wide advantage, always on guard against disruption and harm. The village reaction to innovation can be seen as an effort, supported by most villagers, to keep control of village affairs and to protect its traditions from erosion by the political and social philosophy of a remote, powerful governmental elite. Such a process cannot be understood with a simple formula. Only detailed

description and analysis of individual villages can make sense of specific developments and offer any hope for even quite modest generalizations.

Of the various theories of peasantry as a type of society, the work of Chayanov is perhaps the most useful (Kerblay, 1971; Shanin, 1971a). In his view, peasantry as a social type is defined by an economy based on the family farm worked by family labor. The advantage of Chayanov's definition is that it uses the presence or absence of an institution rather than a continuum of hard-to-define qualities. Chayanov's definition of the family farm has to be qualified in order to fit the conditions in Shanti Nagar, but nonetheless, he is correct in his identification of privately owned farmland, or the rights of cultivation thereto, as the essential characteristic of peasantry, that is, village life. The village-city dichotomy is further marked by other features present in one and lacking in the other. Important urban institutions that are largely absent in villages are factories, bureaucracies, universities, and hospitals. A village that retains its farmland remains a village, no matter how close the villagers' ties are to a nearby city. When the Government expropriates farmland for urban use, the family farm and peasant life vanish, although peasant attitudes may prove to be tenacious as, for example, the desire for real property as the best form of economic security. Characteristic attitudes as much as the family farm make peasantry a worldwide type of society.

A few other theories may be briefly noted though they are of little use in understanding the Green Revolution. We here follow the outline of Attwood (1992), who identifies three economic theories often invoked in the analysis of the economies of developing countries. "Dependency theory" or "world systems theory" holds that the world capitalist system exploits and impoverishes peasants. Peasants are driven into debt, lose their land, and fall into the rural landless proletariat whose labor is exploited by large landowners (Attwood, 1992: 5-6). This has not happened to a significant extent in the North Indian heartland of the Green Revolution. Some farmers do push their luck and contract imprudent debt secured by a mortgage. If crops fail, they may lose land or even commit suicide. During the two years, 1997-1998, almost 400 farmers are reported to have committed suicide in Punjab (Nanda, 1998: 8). A farmer, presumably typical of the debt-burdened, had borrowed Rs. 250,000 to rent nine acres of land. His cotton crop was damaged by insects. Devastated by the crop failure, he ended his life, leaving a young widow and children. Farming is always a gamble on the weather and insect pests, but the Government is not indifferent to widespread disaster and may provide some measure of relief (India Abroad, 1998: 35).

A major weakness of dependency theory is the assumption that external factors are all powerful and that the peasants are passive victims. Attwood (1992: 12) comments, "This is a condescending attitude toward people who are, in fact, creative, innovative, and sometimes powerful in their responses to new external conditions." Attwood argues that the impact of new factors is determined not by universal laws but by specific interactions of technology, environment, and social organization.

"Modernization theory" is more optimistic than dependency theory. It invokes willing imitation rather than malevolent manipulation. Its basic idea is that developing countries, through contact with the West, mimic Western economic and political arrangements to become, in the course of time, fully developed nations (Attwood,

1992: 7). Like dependency theory, modernization theory is much too simple to handle the intricate social and economic situation that one encounters on the ground. It might be plausible if the receiving society offered a clean slate so that impinging ideas would be absorbed without modification. But in North India, new technology and cultivars enter a complex culture where needs are handled differently than in the exporting culture. Thus, diffused artifacts and ideas are modified and reinterpreted to fit a new context. For example, in North India, tractors may be fitted out with a pulley and belt and be used to power tubewells, fodder cutters, grist mills, and threshing machines. Tractors often serve to haul produce to market in a cart in lieu of trucks, and they are widely used for personal transportation.

Like dependency theory, the “standard theory” of commercialization, rooted in the work of Marx and Lenin, foresaw riches for the few and poverty for the many (Attwood, 1992: 9–12). The theory served as a critique of the Government’s policy of promoting the new technology of the Green Revolution, a decision taken in response to chronic food shortages and dependence on foreign food aid. Proponents of the standard theory expected that the Green Revolution would enrich big farmers, impoverish small farmers, and create massive unemployment among agricultural laborers. Technological innovation would create social disruption and engender revolution. The Green Revolution would end in a “red revolution”. In fact, small farmers enthusiastically participated in the Green Revolution, all farmers did better, and even agricultural laborers did not lose any ground although they did not much improve their position from their work as laborers. However, some of them began to participate in agriculture not as laborers but as entrepreneurs, taking land on contract. For most landless people, education and salaried employment were their ticket out of poverty.

The “path dependence” approach to cultural persistence and change tends to shift analysis from factors external to a given society to internal ones. The idea is that analysis of the current characteristics of some component of a particular society, such as land ownership and exploitation, will show where it is headed. Stephen Jay Gould breaks down the path-dependency approach into two elements, “incumbency” and “contingency”. Incumbency means that things tend to remain as they are unless forced to change. “Contingency refers to the fact that the path of development is often determined by specific circumstances not in any particular way inherent in the system but the product of chance, or at least of a confluence of conditions [economic, social, political, environmental, and so on] quite unpredictable from the initial state of the system” (Friedel, 2000: 28). The path-dependency approach in social science is particularly revealing when used comparatively. Similar components of two, more or less independent societies can be compared in terms of initial conditions and then the state of affairs at a later date can be compared. Below, we will make such a comparison of land consolidation in India and France.

Path-dependency theory is closely related to complexity theory, which brings context to the fore. Saperstein explained:

Complexity theories thus depend on the complete “path” taken by the system between its beginning and end points. As such, they are sensitive to all perturbations that may have an impact on the system as it evolves in

time. Every intermediate instant of time may see the theoretical system diverted from the path it might have taken in the absence of perturbations, which are always present. . . . Prediction is no longer possible. The system is extremely context-dependent. [Saperstein, 1995: 550]

Studies of the Green Revolution that we have read are intensely empirical, making relatively little explicit use of the kind of social science theory outlined above. They chiefly try to determine specific effects of the Green Revolution, especially the magnitude of the increase of grain production, the net income per acre from the new seeds and technology, and the distribution of production and income with regard to size of farm and the economic condition of families (Chadha, 1979: 2, 11). Some research deals with the question of whether the gap between rich and poor farmers is increasing or decreasing (Nicholson, 1984: 587; Elder, 1962: 36–37). Other studies investigate whether landless laborers have shared fairly in the new prosperity or have even been displaced by modern technology without compensatory employment off the farm (Chadney, 1984: 229, 235; Dhawan, 1980: 127–128).

The question of whether the new technology of the Green Revolution requires more or less labor than the old technology has received considerable attention. For analytical purposes, authors make a distinction between HYV technology—which consists of the new high-yielding variety seeds, tubewell irrigation, and factory fertilizers—and the agromechanical technology, particularly tractors and threshers. Basant (1987a,b) summarizes a variety of studies that show different results, depending on which factors are or are not taken into account. It is difficult to find any conclusion that holds water in view of the many factors involved. However, it seems that the HYV technology enhances employment per unit of cultivated area. The associated agromechanical technology requires less labor than the traditional technology. In combination, labor needs are reduced by 25% compared to traditional practices and technology, “since the labour augmenting effects of HYV technology do not offset the labour reducing effects of mechanised techniques” (Basant, 1987a: 1307; see also Bhalla, 1989: WS-67). The negative impact of mechanization on labor is seen most clearly in the case of specific crops, chiefly wheat and to a lesser degree, paddy (Basant, 1987a: 1307, 1987b: 1360).

Some studies show a strong interest in enhancing equality, warning of dangerous social tension if poor villagers perceive their circumstances as deteriorating in comparison with their neighbors (P. Singh, 1975: 43, 58). A contrary opinion is also expressed, namely that uniform proletarianization of the countryside would yield undesirable effects, especially an increase in rural unemployment. This view holds that only the development of capitalist agriculture can insure efficient production and absorb local landless laborers (Shergill, 1989: A-12). Chambard (1980: 84) points out that modern agriculture requires investment and, thus, there is nothing to be gained from a redistribution of land so as to produce a uniform rural proletariat.

Chadha and Khurana compare Punjab, an area of rapid economic growth in general and agricultural transformation in particular with Bihar, a region where growth has been very slow and unsteady. Their data dispel the belief that benefits have failed to percolate to the poor, at least in Punjab, where the gains from the Green Revolution

and from rapid and sustained economic growth have been shared by all the rural population. In Bihar, such gains have largely bypassed the lower strata of the rural population because economic growth there has been sluggish. "Consequently, there has not been much to filter down the rural hierarchy" (Chadha and Khurana, 1989: 2623).

Most studies are based on the analysis of district or statewide statistics from Haryana and Punjab. Studies carried out in individual villages are rather rare, but they are especially valuable because they provide a specific social and ecological context in which the Green Revolution took place (e.g., Bonner, 1987; Chambard, 1980; Elder, 1962). However, studies of small units can be generalized only to quite limited regions. Statistical studies of large regions are necessary and valuable but they can deal with only a few parameters. Their conclusions tend to vary considerably, largely because they use different data. Stripped of village and familial context, they miss the resourceful way that families adjust to altered circumstance and may distort the overall picture. Leaf, who studied a village in Punjab comments:

Evaluations of [the Green Revolution] have varied greatly, largely because of the inherent ambiguity of the types of analyses on which evaluations are based. To achieve "generality" in a brief compass, highly specific types of data have typically been aggregated from very wide regions. This has inevitably melded phenomena that never occurred together in fact, while actual contexts have dropped away and their explanatory value has been lost. An analysis that focusses on more aspects of a single local situation may at first seem more limited than a global comparison of just a few aspects, but it permits the tradeoffs for individual decision-makers to be traced unambiguously, so that the picture that ultimately emerges is far more clear. [Leaf, 1980-81: 617-618]

The unambiguous results of the Green Revolution are that the yield of food grains has at least doubled and that almost all farmers have benefited (Chadha, 1979: 72; Blyn, 1983: 705-706). So have the landless people, but their improved circumstances owe more to the expansion of jobs in government, trade, and industry than to the Green Revolution. Although wage rates for agricultural labor have done little better than keep pace with inflation, the economic condition of landless laborers has greatly improved as they largely abandon such work for city jobs or entrepreneurial agricultural enterprises (Blyn, 1983: 712-713). In brief, almost everyone is better off today (Johl, 1975: 185, 189). Other aspects of the Green Revolution are less clear, for example, the question of whether it has benefited the rich proportionally more than the poor. Leaf (1982: 268, 1984: 131) says that the poor have benefited as much as the rich. D. P. Singh (1980: 323, 325) says that while the poor have profited they have done less well than the rich.

The scope of change due to the Green Revolution—even broadly conceived to include social developments, such as increasing nontraditional employment for both women and men, a lesser emphasis on the traditional caste hierarchy, and restratification of individuals by occupational roles—should not be exaggerated (Marriott, 1973: 214). The Green Revolution can be put in rough perspective by comparing it to some of the changes that have taken place in the United States during much the

same period, that is from the 1950s to the 1980s: the computer, television, electronic document transmission, the ubiquitous automobile, the interstate highway system, the substantial replacement of passenger trains by air travel, shopping malls and suburbia, the decline of the "downtown" heart of small cities, the steady reduction in the number of family farms and the size of the rural population, the loss of entire major industries to foreign competition, and the shift of the workforce from manufacturing to service industries. The list of technological and closely related changes could easily be extended.

Technologically, the Green Revolution was based on the internal combustion engine and electricity. Its main effects were felt largely in the countryside. The basic new element in the recent American technological revolution was electronics, which not only created gigantic new industries but also transformed existing office and factory procedures. The electronic revolution in America affected almost everyone, not just farmers and agricultural laborers.

Social developments in America generally unrelated to technological change include the civil rights revolution, the feminist movement, the sexual revolution, a drastic rise in teenage pregnancy, the legalization of abortion, the acceptance of homosexuality, an increase in the number of families headed by women, welfare as a way of life, the denigration of the "traditional" family, the decline of authority and a leveling of social distinctions, and a rather stunning coarsening of popular culture.

Technological and social changes have varying impacts. Technological change is in all likelihood easier to accept and usually less contentious. Computers have permeated almost all aspects of American life with little or no opposition. They may have eliminated particular jobs and caused hardship for some people, but they have also created jobs, probably more than have been lost. In any case, there is no denying their capabilities and benefits. On the other hand, some social changes have generated intense dispute and social cleavages. Examples are abortion, the nature of sex education in the primary grades, the scope of homosexual rights, job quotas, and draconian codes governing speech in universities.

Although an objective judgment is impossible, one could reasonably argue that America has seen more far-reaching change than has India. However, many developments, both technological and social, that have swept through America in the last several decades are on India's doorstep. It may be that India is only a few years behind America, just as she was only a few decades late in shifting to mechanized farming. Items such as television sets, radios, computers, tape recorders, personal transportation (scooters, cars, and in the rural areas, tractors), and, recently, cellular telephones are routine for the middle class and widespread among well-off farmers in India.

It is not just useful or entertaining technology that is diffusing from abroad. Social change, some of it at variance with traditional values, is also prominent in today's urban India. The signs are everywhere. For example, in its number of August 27, 1993, *India Abroad*, a newspaper published in New York for the Indian community in North America, devoted four pages (pp. 28–31) to "The Changing Attitudes Toward Sex". The major article, "A Return to Ancient Liberalism" by M. Chhaya, begins by taking a long historical perspective, which later gives way to an emphasis on the influence of contemporary trends in the United States and the West. India is

a society, says Chhaya (1993b: 28), "... struggling to rediscover its ages-old sexual liberalism made famous by the *Kama Sutra* [an ancient book of aphorisms dealing with desire and sex]." Chhaya says that centuries of Moghul rule followed by the Victorian prudery of the British Raj put a damper on liberal sexual attitudes, but now there is a return to a more open, less restrained attitude toward sex that characterized pre-Moghul North India.

However, another observer whom Chhaya cites questions whether the *Kama Sutra* and erotic sculpture and paintings have much to do with the gradual liberation of sexual attitudes during the 1980s. Instead, they are seen as a corollary of the sexual revolution in the West that began in the 1960s. American television is extremely popular among teenagers, who are the standard-bearers of the Indian sexual revolution, especially teenage girls. Chhaya cites a popular TV series, "The Wonder Years", whose protagonist is a 13-year-old boy. His life revolves around dating and girls. Dating is now common at Indian urban schools and universities. Like much else in India, the sexual revolution combines distinctly Indian elements and foreign influences.

Phenomena associated with sexual liberation are teenage pregnancies, an increase in the incidence of rape (although statistics in this realm are always suspect, for the "increase" may represent no more than better reporting), a surge in pornographic magazines, films that exploit rape scenes, lewd dancing and bawdy lyrics, and a lively sale of aphrodisiacs by street vendors. S. G. Mozumder (1993: 30) in his article "Fake Sex Specialists Are Thriving", quotes the hard sell of a street vendor, "Take this medicine and you can even break a brick into two pieces. . . ."

What keeps the sexual revolution from getting out of hand is chiefly the restraining influence of the traditional family and the fact that family honor is intimately connected to the virtue of daughters. Behavior that is acceptable or at least tolerated in cities is still quite dangerous in the rural areas where 75% of the people live. Crossette (1991: 60) reported that relatives and neighbors lynched three young people in a village about 100 km from Delhi. A high-caste Jat girl wanted to elope with a Harijan. The couple was aided by a young friend. The village council sentenced them to death when the girl vowed to remain with the Harijan. The girl's mother commented, "A Jat girl marry a Harijan? . . . This may happen in towns but not here."

India Abroad (1993a, Aug. 20: 8) reported the beheading of a newly married couple because their marriage was incestuous—the bride was a distant niece of the husband—and tarnished the reputation of both the concerned families and the village. After eloping and living in Delhi for four months, the couple returned to their native village. They were summoned to appear before the village elders, where an uncle of the bride took out an ax and cut off her husband's head. When the bride rushed to her husband, her uncle did the same to her. The drama allegedly took place before 250 villagers. There were no protests. Neither the bride's nor the groom's family showed any remorse. The bride's grandmother said, "This is the retribution for what she . . . had done to the family's honor. Our name is in the mud. Can I look anyone in the eye now?" The village headman said that the punishment was socially justified. Even a local police officer said, "Anyone whose dignity has been offended like that of [the killer] would have been furious. . . ." He said, however, that poison could have been used instead of an open execution. The incident "... sent shock waves

around India" and was the subject of a strongly worded lead editorial in *The Times of India*. However, in rural areas, traditional law runs its course, largely unimpeded by modern criminal law. We have reported similar cases (R. Freed, 1971; R. Freed and S. Freed, 1985: 143–145).

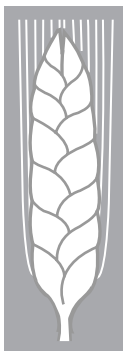
A development in India that parallels a similar policy in the United States is reserved government jobs for the underprivileged. For many years, 22% of government jobs were reserved for low-caste and tribal people. In 1993, an additional 27% of government jobs were allotted to "Other Backward Classes", a measure that will benefit 1200 castes. People otherwise eligible who are judged to be well-off (the so-called "creamy layer") will not be covered. With the implementation of the latest quotas, almost half of all government jobs are reserved for the underprivileged classes, which are in the majority in India and form a potent political force. Politicians claim that the new measures are designed to provide justice to long-neglected groups, but people are quite aware of their political expediency. The initial job reservations have greatly benefited the two lowest castes in Shanti Nagar, and the new measure will perhaps cover a few more castes. On the other hand, the higher castes are bitter, pointing out that jobs for which they are well qualified go to persons with inferior qualifications. Government positions are highly sought by the educated middle class, and job quotas provoked nationwide protests. Scores of students committed suicide by self-immolation (India Abroad, 1993b, Sept. 17: 20; Pradhan, 1994: 25).

Recent events in Asian television have readied the ground for an avalanche of alien cultural influences into India. The vector is Star TV, a Hong-Kong based, pan-Asian satellite network. Rupert Murdoch, an international media tycoon known for his iconoclastic, sensational, hard-driving approach to news and entertainment, bought a controlling interest in Star TV in 1993. M. Chhaya (1993a: 2) predicts that Murdoch's entry into India "... is going to be of far greater social, cultural, political and economic consequence than any media event before, including the advent of Star TV." Later in 1993, Star TV announced the purchase of 49.9% of Asia Today Ltd., owner of Zee TV, a popular Hindi channel seen in seven million homes, or 25% of the total of Indian households with TV sets. Zee TV is the fastest growing Hindi channel in Asia (Chhaya, 1993c: 41).⁶

Star TV has already substantially changed the national television network (Doordarshan), breaking its thralldom to the Government. In response to the popularity of Star TV, Doordarshan has reduced its public service role and plans to introduce five entertainment and information channels. Although Star TV currently has only one-fifth the number of viewers as Doordarshan, it is a useful voice for India's avant-garde. Whether for better or worse, the Indian generation raised on global television will be different from its predecessor. So far, India is taking satellite TV in stride, perhaps because throughout her history, India has had to live with major external influences. In any case, global satellite television has come to India to stay.

The next study of change in Shanti Nagar will focus on the village before and after the electronic revolution, just as our 1977–1978 study is oriented around the village before and after the Green Revolution, and the 1957–1959 study followed in the wake of the dramatic changes associated with Independence. The first watershed was political, the next two technological, although social change always accompanies

technological change. It is perhaps idle to speculate about the next threshold event, but the problems that currently bedevil India suggest that important social and political changes, not necessarily benign ones, are more likely than any dramatic technological innovation. Such problems include a population that soon will be the world's largest, widespread poverty, urban chaos, unresolved communal tension, and the insurrection and terrorism that are flickering along the northern border from Assam through Kashmir to Punjab. These problems do not lend themselves to technological remedies, although a miracle contraceptive might help to control population growth. The other problems will find their solutions in the sociopolitical realm. Be that as it may, the basic character of Indian civilization will not change very much. Despite tractors and electricity and men in business suits, we easily recognized the Shanti Nagar of 1957 in the village of 1977.



CHAPTER ONE

LAND AND MODES OF CULTIVATION

AREA AND OWNERSHIP BY CASTE

THE TOTAL AREA of village land remains generally constant. However, one finds considerable flux when dealing with classes, or categories, of land. The habitation site grows at the expense of common grazing land and of agricultural land. The area of waste land grows or shrinks; specific fields come into or go out of production because of variation in rainfall or an accumulation of *shor*; more land comes under irrigation or the method of irrigation changes; village ponds are filled for agricultural use; and perhaps the Government takes over land to enlarge a road. Access to specific parcels of land and, to a lesser extent, landownership vary from one cropping season to the next, and access itself takes several forms, for example, mortgagee, sharecropper, leaseholder, or purchaser of a standing crop. The situation is fluid, governmental records never fully agree with the situation on the ground, and even an intensive survey would leave gaps in the record, for no questionnaire could encompass all the possibilities.

Chambard (1980: 2)—whose study of land use in Piparsod, a village in Madhya Pradesh, is a model of precision—noted, concerning governmental records, that there was no map of the village site and the map of the agricultural land was not up-to-date. He had to make 300 changes to correct the cadastral map. Other investigators have reported that patwari records are unreliable guides to the actual situation in the village, partly because they are difficult for the uninitiated to use (F. Bailey, 1957: 279–284; Lewis, 1958: 329–347). Nonetheless, they provide a great amount of information and the margin of error is not large. Moreover, they are of the utmost importance for the individual owner because they are the official record. If a landowner becomes aware of an error in the record, he takes steps to correct it.

In 1970–1971, village land was thoroughly surveyed for purposes of land consolidation (*chakbandi*). The survey was done as accurately as possible. It was taken by governmental officials in consultation with the landowners. Each landowner received documents describing his fields and their precise locations. However the cadastre does not contain the informal arrangements among villagers. An economic study of a village has to take account of various leasing and rental arrangements or a report will be distorted, especially with regard to landless persons, many of whom

now participate in agriculture as entrepreneurs through leasing arrangements. As time passes, even the basic information about land ownership will drift away from the current situation. For example, when a joint family splits, the descendant families may divide the land informally but delay changing the patwari records (Chambard, 1980: 2-3).

According to the survey taken for land consolidation, the total area of the village was 4867 bighas and 3 *biswas* ordinary (1014 acres), or in the commonly used notation, 4867-3. Various categories of nonagricultural land, such as the habitation site (*abadi deh*) amounted to 425-10 bighas, which were not included in the *chakbandi*. The rest of the village land, 4441-13 bighas (925 acres) was agricultural land that was available for consolidation.

In the 1950s, we calculated the village area to be 5090 bighas (1060 acres). We used our own survey of the agricultural land based on an interview with each landowner, which gave a total of 4577 bighas (954 acres), and added to this figure the areas of the habitation site, the common grazing land, and land used for such purposes as roads and railroads that were given in the patwari records to arrive at the total of 5090 bighas. Our calculations from the 1950s and the cadastre from the 1970s agree reasonably well. The difference between the total figures is only 222-17 bighas or 4.6% of the later figure (4867-3). The difference in the agricultural land is only 135-7 bighas, or 3% of the later figure (4441-13).

The discrepancy in familial (agricultural) land is small when compared to the comparable situation found by Chambard (1980: 3) where the difference between the amount of family land obtained by interviewing and the figure in the land records was 15%. Because of recent land consolidation, it is possible that we had available more up-to-date figures for Shanti Nagar than Chambard had for Piparsod, where evidently *chakbandi* had not yet taken place, a circumstance that may have brought our survey results and the governmental records into closer agreement than in Piparsod.

In the 1970s, as in the 1950s, we asked each family how much farmland it owned. The total was 3937-2 bighas (820 acres), 504-11 bighas less than the figure recorded in the Government survey taken in 1970-1971 and 639-18 bighas less than our own survey from the 1950s. The discrepancy between our 1970s survey and the Government figure amounts to 11%, rather large but still less than the 15% found by Chambard. Four chief factors probably contributed to the discrepancy that we found between our survey (late 1970s) taken after land consolidation and the Government survey taken in preparation for consolidation: the enlargement of the habitation site, which resulted in the loss of farmland, the transfer of some waste land from private ownership to village control, new survey methods that slightly reduced the size of the village, and the fact that our informants were answering our questions in the 1970s in terms of standard measurements rather than ordinary ones (see below). Because the village was slightly smaller after the new survey, the land of each farmer was reduced in proportion to the size of his holding. As for standard and ordinary measurements, they are not directly comparable. A farmer with two ordinary acres before consolidation and one standard acre afterwards has not necessarily "lost" any land. He has just traded land of lesser value for better land (see details of the process of land consolidation in the next section).

In the 1950s, almost all the farmland was owned by just two high castes. The Jat Farmers, the principal landowners, had title to 3746 ordinary bighas, which amounted to 82% of the farmland of the village. Jat farms averaged 125 bighas (26 acres, 10.5 ha) per family. The Brahmans owned 795 bighas, or 17% of the agricultural land. Brahman farms averaged 36 bighas (7.6 acres, 3.1 ha) per family. The five Bairagi (Mendicant Priest) families owned a combined total of only 14 bighas, an average of 2.8 bighas per family. The single Mali Gardener family owned 7 bighas.

Only one low-caste family, a Chamar Leatherworker, owned land. He had won 15 bighas from a Jat in a court case. The Delhi Land Reforms Act of 1954 provided that tenants who had cultivated land since 1952 or before were to become its owners. The intent of the act was to create a uniform body of peasant proprietors with no intermediaries. In Shanti Nagar, the most common result of this legislation was that tenants voluntarily, or under varying degrees of pressure, furnished statements that they had not cultivated the land in question during the critical period.

However, the Leatherworker was both combative and ambitious. He made two attempts to win title to land under the terms of the land reforms act. An effort to win land from a Brahman ended in failure, despite the Chamar's strong legal and political position. He was listed in the land records as the cultivator of the disputed land, which was the critical legal point. Moreover, he had a powerful Jat ally, his patron, to whom he owed several thousand rupees. His patron was afraid that he would not be repaid if the Chamar lost his case. However, other landowners were putting strong pressure on the Jat, who eventually capitulated and withdrew his support from his Chamar client. The Leatherworker's position then deteriorated, and he eventually made a statement to the authorities that he had never farmed the disputed land.

Although the Chamar lost his dispute with the Brahman, he did win some land from a Jat Farmer on the basis of the new land reform legislation. The Jat did not fight, possibly because his family had only recently moved to the village. The Chamar won 15 bighas, about 3 acres. In commenting on the behavior of the passive Jat, a Brahman man said, "You've got to have a big heart to hold the land."

Two decades after the land reforms act went into effect and several years after land consolidation, the caste-wise distribution of land in 1977–1978 was almost the same as in 1958–1959. Jats and Brahmans owned 98% of the village agricultural land; in the 1950s, they owned 99%. Jats were the principal landowners. Their 3073 bighas (640 acres) amounted to 78% of the village farmland. All 45 Jat families owned land, their farms averaging 68 bighas (14.2 acres). The 793 bighas of Brahman farmland were distributed among 46 of the 47 Brahman families; their average farm was 17 bighas (3.5 acres). One of 20 Chamar Leatherworker families owned 20 bighas. The single Mali Gardener family in the village owned about 7 bighas.

All six Bairagi families owned land, a total of 45 bighas, making the size of their average farm 7.5 bighas. The Bairagis increased their landholding from 14 bighas (1950s) to 45 bighas (1970s) because of population increase and land consolidation. The habitation site had to be expanded to accommodate the larger population. Much of the Bairagi's land fell in the expanded habitation site. Land in the habitation site was the most valuable in the village. The Bairagis kept the plots that they needed in

the habitation site and surrendered the balance of this land in exchange for more land of lesser quality.

The Government wanted to use land consolidation to change the caste-wise distribution of land. The *pradhan*, head of the Gram Sabha (Village Society), was supposed to give one acre of village common land to each of the 60 Harijan (low caste) families resident in the village. The Harijans (or Dalits) of Shanti Nagar were the Chamars and Chuhars. The Gola Potters were not Harijans, but they were landless and low caste and were grouped with the Chamars and Chuhars for purposes of land distribution. Each family would pay Rs. 125 to the village council for its acre, an amount much less than the value of the land.

The *pradhan* at the time of land consolidation, a Jat landowner whom we call Actor, did not make the required distribution. He said, "I did not distribute the land because it was already occupied by landlords. To try to change the situation could lead to murder. The people here are dangerous." In taking this stand he claimed to have defied an important official. "He could do nothing to me," he said. A Brahman man confirmed that all the cultivable common land was occupied. He said that only barren common land was lying vacant. The man who succeeded Actor as *pradhan* in late December 1977, another Jat landowner, also did not make the required distribution. In fact, he himself had occupied village common land. The gap between law and its implementation in the villages is often large.

We understood that the land to be transferred to the Harijans would be considered a transfer of title. Actor had a different interpretation, which we heard from no one else. He said, "The Gram Sabha could obtain income from its land by auctioning it for a year. That used to happen here. The Rs. 125 that the Harijans pay for land is rent for a five-year period for one acre. If such land were auctioned, the Gram Sabha would receive Rs. 500 to Rs. 700 from the landowners every year for one acre. The Government favors the Harijans."

Various classifications of soil and topography are in general use. The distinction of *khadar* (riverine zone) and *bangar* (higher land not subject to flooding) has already been mentioned. There is also irrigated land as opposed to land cultivated by rainfall, known as *barani* land. Irrigated land is further subdivided into well (*chahi*) and canal (*nahri*) irrigation. In addition, soil is classified by consistency. *Rausli* is a light loam, a mixture of clay and sand that varies somewhat in relative proportions. *Dakar* is a stiff clayey loam, and *bhur* is a sandy loam with just enough clay in the mixture to allow cultivation. Villagers also spoke of *dhari*, naturally moist low land, and *bani*, described as relatively poor land near the canal at some distance from the habitation site, which was overgrown with shrubs and trees. Another village classification was into hard (*dakar*) and soft (*naram*) soil. Hard soil is said to be resistant to insects. It is difficult to plow with bullocks, but tractors plow it easily. Tomatoes planted on soft soil are in greater danger of an infestation of insects than those on hard soil. Other categories are land affected by *shor* and land that has lain fallow for at least eight successive harvests (*banjar qadim*). Land is also classified by distance from the habitation site. Land close to the village is known as *gora* (India, 1912: 103–104; Maheshwari, 1976: 6–8; S. Freed and R. Freed, 1978: 24–25; Crooke, 1989: 55–63).

CONSOLIDATION

Land consolidation is one of the five pillars of the Green Revolution. Three components—private tubewell irrigation, improved seeds, and mechanization—could not be used effectively in an area of landholdings fragmented into small parcels. The improved seeds need precisely timed irrigations that would be difficult to arrange without tubewells (Gavan and Dixon, 1975: 547). Farmers could not afford tubewells unless enough of their land was in one place to justify the expense (Elder, 1962: 33). Tractors cannot be used effectively on small irregular parcels, and to move a tractor from plot to plot requires wide paths between fields or else coordination of planting and harvesting operations among several farmers. Although some improvement in agricultural productivity could have taken place without it, land consolidation was a necessary step for the spectacular results of the Green Revolution.

Consolidation is the remedy for land fragmentation, the division of a single farm into numerous scattered, often irregularly shaped parcels of land. Where the condition exists, it characterizes most of the farms of a village. It is common in densely populated rural areas where all cultivable land has been under the plow for generations and where the laws of inheritance may transfer land title to several heirs (Binns, 1950: 5). Various provisions concerning wives and daughters aside, the laws of inheritance in Shanti Nagar and in North India generally designate all the sons of a landowner as equal heirs. Although there is some consolidation of farmland when families die out, the usual effect of such inheritance is to chop a farm into ever smaller parcels, for the heirs do not distribute the existing parcels, thus maintaining the same number, but tend to divide each parcel, which leads to progressive fragmentation.

Bonner (1987: 14) points out that fragmentation may in some circumstances be beneficial. For example, it may reduce the risk of extensive damage to the crops of an individual farmer by distributing parcels of his land among several areas of microenvironmental diversity. Sometimes, what appear to be slight differences in the location or elevation of a field can produce substantial differences in yield depending on long-term cycles in rainfall. Such was the case in Shanti Nagar, where villagers told us that currently poor land was once the most fertile. Many farmers, therefore, prefer to have part of their land in that once-fertile area to guard against a return of previous conditions.

However the beneficial aspects of land fragmentation, which usually pertain to special situations, such as hilly areas (Binns, 1950: 5–6), are usually far outweighed by its disadvantages. Binns gives a comprehensive summary of the many problems caused by fragmentation:

Time is wasted and extra expense involved in moving workers, animals, and implements to and from the farmstead and from one field to another, and in carrying seed and manure to the various fields, and crops from the field to the threshing floor, stockyard, or barn; supervision is rendered more difficult; depredations of animals and birds are harder to control; expense on fences, water supplies, buildings, threshing floors, etc., is often much greater; comprehensive drainage or other schemes of improvement may be rendered impossible; access to the various fields may be difficult,

especially during the season when crops are on the ground; more hands may be required, especially for watching cattle and crops; and so on. [Binns, 1950: 15]

Land consolidation is appropriate where land fragmentation is so extensive as seriously to impair agricultural production and efficiency. "Consolidation may be defined as the amalgamation and redistribution of the lands of an estate to decrease the number of parts of that estate" (Bonner, 1987: 13). The initiative comes from the State Government (in Delhi Union Territory, the Delhi Administration), for the process has to be controlled by impartial experts, and the results certified by the appropriate authorities. Land consolidation can be imposed by the Government but ordinarily coercion is not necessary. Although in the early days of consolidation before the introduction of the high-yielding varieties villagers were initially hostile, they liked it when they realized that farm operations were made more efficient (Elder, 1962: 26, 34). Villagers nowadays desire consolidation because its advantages are even more evident with the advent of mechanization and the high-yielding varieties, and they participate in every stage of the process.

However, land consolidation goes much beyond simple consolidation; land reform is also an aspect of the consolidation program, specifically, the distribution of some village common land to landless Harijans. Reactions of landowners to this development range from resigned acceptance to open hostility, which may assume the magnitude of a local insurrection. A high-caste informant described a confrontation in Kanjhawala, a village in Delhi Union Territory, where "hundreds of thousands" of people from landowning castes assembled to protest the distribution of village common land to Harijans. To defuse the situation, the Government had to bend a little, or at least give the impression of compromising.

A low-caste villager described the same confrontation, remarking that one or two people were killed and the police were called to protect the Harijans. We asked if the distribution of common land would be important in the village election that was taking place that day in Shanti Nagar. He replied, "No. People today are educated and have service [jobs]. They are not so much concerned with small amounts of land. They are more concerned with improving the village as a whole." However, a landless Blacksmith commented, "At first I asked myself what was the use of one acre of land. Then I realized that at least people could raise fodder [probably clover] and therefore could keep a buffalo. I can go to the Block Development Office and borrow Rs. 3000 for a buffalo and repay in three years."

In Piparsod, Madhya Pradesh, Chambard (1980: 42) reports that giving common land to the landless low-caste Chamar Leatherworkers during the Emergency (1975–1977), which was proclaimed by the Congress Party led by the late Indira Gandhi, enraged the villagers. It reduced the amount of village common land, already insufficient, and people thought that the Chamars were already rather well off. Moreover, the program did not really seem to benefit those who received the land. Taking up agriculture apparently did not improve the lot of the recipients of the 1970s any more than it did the beneficiaries of a similar program in the 1960s, more than half of whom abandoned farming, almost all in greater indebtedness than before the expe-

rience. In any case, everyone turned against the Congress Party. After the election of March 1977, which the Congress Party lost, the voters realized for the first time the power that they had.

The purpose of land consolidation is to concentrate the land of particular farms in one or two places, to reduce the number of plots in the village by increasing the size of each, to have fields of standard shape whose boundaries are precisely defined, to create conditions for the improvement of irrigation facilities, and to render uneconomic into economic holdings. In addition, the consolidation process requires that land be reserved for common purposes, such as schools and cremation grounds. Delhi Union Territory follows the East Punjab Holdings (Consolidation and Prevention of Fragmentation) Act, 1948, and the Delhi Land Reforms Act, 1954 (Delhi Administration, 1976: 608–611).

The process of consolidating land has four major stages, as summarized by Bonner.

- I. Initiation of activities
 - A. Village selected
 - B. Advisory committee formed
- II. Correction of current records
- III. Preparation of scheme for reallocation
 - A. Value of current holdings assessed
 - B. Land set aside for communal use
 - C. New holdings assigned to each cultivator
- IV. Repartition
 - A. Transfer of ownership
 - B. Preparation of a new set of records (Bonner, 1987: 21–22) (See also National Commission on Agriculture, 1976: 199–206.)

First, a governmental reconnaissance team identifies a village fit for consolidation. The chief criteria for consolidation appear to be cooperative villagers and a high proportion of farmland that is productive, relatively immune to the vagaries of nature, and not used for highly specialized crops. The criteria of favorable terrain seem to follow from the list of conditions that render a village unsuitable for consolidation, that is, "Villages where major areas are subjected to fluvial action, intensive soil erosion, prolonged waterlogging or having a large area of barren lands, old fallows or saline land [or] large areas under betel leaves or such flowers as are used for extraction of essence are excluded from the scheme of consolidation" (National Commission on Agriculture, 1976: 200). Bonner (1987: 24) comments that these "more difficult villages" were left for later attention after the easier villages had been consolidated.

Next, the consolidation officers form advisory committees, the most important of which consists of villagers, for villagers participate in making decisions and in the implementation of the final plan. In Haryana and Punjab, village committees are supposed to be composed of all the members of the village council (panchayat), a few progressive farmers, and two Harijans and other rural laborers. Together with Government officials, the village advisory committee determines the value of each parcel of

land, the areas to be reserved for common use (e.g., schools, cremation grounds, and roads), and participates in correcting the village land records and maps.

With land consolidation farmers exchange fields. To insure a fair exchange, the value of each field has to be determined. Three methods have been in use for appraising the value of fields: (1) market price, (2) rental value, and (3) agricultural productivity. The first two methods proved to have weaknesses (National Commission on Agriculture, 1976: 201–202; Bonner, 1987: 22). The third method, agricultural productivity, is now preferred. The village advisory committee and the consolidation officers appraise every field in terms of its agricultural productivity, using the *annawari* scale. The best land is generally rated at 16 annas (there are 16 annas in a rupee). Fields of lesser productivity are rated, in 2-anna steps, from 14 annas to 2 annas (see Appendix for nuances). Nonagricultural land in the village habitation site is also rated on the *annawari* scale, but generally without fine gradations. Thus, most, if not all, land in the habitation site may be valued as two-rupee (32-anna) land.

The *annawari* scale is tantamount to a ratio scale, at least in some ranges. One unit of 16-anna land equals two units of 8-anna land. In practice, the exchange of land probably involves considerable compromise, as mathematical precision has to be adjusted to the facts on the ground. That adjustments are made becomes evident when the factor of “minor differences” enters the calculations (see below). However, value is determined by an accepted scale, and land is thereby “standardized”. After standardization, when farmers were asked how much land they owned, they often replied in the form “*X* standard acres (*kilas*)”, which in the case of a specific farmer may not have equaled *X* ordinary acres. Consider the case of a hypothetical farmer, Ram Krishan, who once owned 2 acres of 16-anna land and 2 acres of 8-anna land. Before consolidation, he owned 4 *ordinary* acres of land. If he traded his 2 acres of 8-anna land for 1 acre of 16-anna land, he would then own 3 *standard* acres after consolidation. (He owned 3 standard acres even if he traded no land.)

Some farmers spoke of “losing” land in land consolidation. In the case of Ram Kishan, this would mean that 4 ordinary acres had become 3 (standard) acres. However, in such a case, the farmer would observe that he now had better quality land. Losing land could also mean that a farmer lost his “barren” or other land, which was taken over by the village council for common purposes. Some villagers inevitably were left with poorer quality land after consolidation, a loss which was compensated by more land.

Consolidation also has to deal with such features as trees, dugwells, tubewells, and buildings, none of which can be moved, at least not easily. Capital improvements are assessed in rupees, and appropriate adjustments are made in the original owner’s new allocation. Sometimes, compensation to be paid for wells and buildings is left to negotiation between the farmers involved in the exchange. (See Binns, 1950: 26–28 for a discussion of the problems of evaluation.)

The boundaries of the consolidated fields are set by a process called “rectangulation”. The Survey of India has laid rectangles of 3000 acres following latitude and longitude lines in most of Haryana and Punjab, which are divided into rectangles of 100 acres, in turn divided into 25-acre rectangles, and finally into plots of 1 acre (National Commission on Agriculture, 1976: 207). Thus, most fields are uniform

1-acre plots, although necessarily some fields are less than 1 acre and not all fields have the same shape. There are variously shaped rectangles, trapezoids, and triangles, especially along the village boundary. In Shanti Nagar, the 25-acre rectangle measures 133.33 *gathas* $\times$ 120 *gathas* and the 1-acre rectangle measures 26.67 *gathas* $\times$ 24 *gathas*. (One *gatha* equals 99 inches.)

After rectangulation, consolidation officers repartition the village land among the landowners in accordance with the allotable valuation of each farmer's land. The new land of an individual farmer is concentrated around a "center" which usually lies in the largest of his preconsolidation plots. The repartition scheme is published in the village, and new holdings are demarcated and shown on a map, which is also published. The details of the published repartition are conveyed in writing to each landholder.⁷ Objections are heard and appropriate modifications are made. Farmers may negotiate among themselves, slightly altering field boundaries. Finally, the repartition is confirmed by the Kanungo (an official who supervises several patwaris), the Assistant Consolidation Officer, and the Consolidation Officer. The appropriate governmental records are prepared, money owed for wells and other things is paid, and the consolidation is complete (National Commission on Agriculture, 1976: 199–210; Bonner, 1987: 20–28).

The consolidation of land in Shanti Nagar took just over a year. The process and record of meetings are preserved in governmental records. The first meeting took place in the village on November 16, 1970, followed by more than 20 irregularly spaced meetings during the succeeding year. Finally, after all objections to the proposed consolidation plan had been heard and decided, the repartition was passed and signed by the Consolidation Officer on November 24, 1971, although a few corrections and allocations to landless persons continued to be handled until January 13, 1972.

Meetings were announced by the beating of drums. Landowners and other interested villagers then assembled at one of the village meeting houses (*chopals*). The record of the first meeting notes that members of the panchayat and other landowners were present. The Assistant Consolidation Officer presided. He explained to the villagers the legal definition of "Public Notice", and the villagers stated that indeed the Public Notice had been propagated by the beating of drums, that they understood completely, and that after the meeting, one copy had been posted at the meeting house. They stated that they knew the appointed Consolidation Officer very well. The record of the meeting was signed by the Assistant Consolidation Officer and by the village watchman, an illiterate Harijan, who affixed his thumbprint.

The principal work at the first meeting was the selection of the advisory committee. After public discussion, 15 men were named: 10 Jats, 3 Brahmans, 1 Bairagi, and 1 Chamar. The dominant position of the Jats in the village is marked in the advisory committee. All the members were landowners, all with large or at least moderate holdings except for the Bairagi, who owned less than two bighas. The sole Harijan member was a landowner. Although we do not have a list of panchayat members from 1970, in all likelihood, most of them were on the advisory committee. The *pradhan* was a member, as was the ex-*pradhan* who had served two terms before the current officeholder. A future *pradhan* was also a member. No landless person or woman served on the committee.

The next meeting took three days, February 4, 5, and 6. This was a key meeting at which consolidation officers and the advisory committee appraised all the village land. The land was divided into two blocs, *bangar* and *khadar*, separated by the road to Narela (fig. 1). West of the road was the *bangar* area; to the east, the *khadar* area. Landowners wanted a piece of land in each bloc. The land was evaluated by the *annawari* scale, and the report of the meeting precisely identifies the location of the 16-anna land, the 14-anna land, and so forth. No land in the *bangar* bloc could be rated at 4 annas. The 2-anna land comprised barren and waste land. In the *khadar* bloc, there was no 16-anna, 12-anna, or 10-anna land. As in the *bangar* bloc, the 2-anna land was barren and waste land.

Tubewells were also appraised. If the original owner was willing to give up the land with the well, he would recover the price of the well from the new owner. The original owner had the option of deciding whether to abandon the tubewell. Borings with only a pipe were not evaluated. The original owner could pull out the pipe or, if he left it, could negotiate a price with the new owner. Dugwells were not evaluated because they were not used for irrigation. The original owner received no payment if he abandoned one, but in fact payment was apparently made in some cases. Trees were not appraised. The original and new owner could negotiate a price, or the original owner could fell the tree and take it with him. Many trees were cut down. After consolidation, the fields were largely denuded of trees, a development which a farmer called to our attention our first day back in the village, as noted above.

On February 9, copies of the consolidation program were distributed to the landowners, and in March, two meetings were held to hear objections concerning the evaluations and to make appropriate changes. During the second of these meetings, on March 16, the names of minors, military personnel, prisoners, and mad people were read and confirmed, and their guardians and trustees were appointed. On May 1, a notice was posted in the *chopal* that the Consolidation Officer would present the plan for consolidation in the village *chopal* on May 15.

The meeting on May 15 for presenting the consolidation scheme in detail was the climax of the land consolidation in Shanti Nagar, although several subsequent meetings were held to revise specific points. The Consolidation Officer himself presided rather than the Assistant Consolidation Officer, as at previous meetings. Before coming to the details of the consolidation plan, the Consolidation Officer reconfirmed several matters that were taken care of at earlier meetings. The list of guardians for minors and other people was read out and the people present stated that it was correct. The people present were questioned about the members of the Advisory Committee, and they affirmed that no one had any objections to the membership. Finally, the Consolidation Officer announced that the village land owned by the Government would be controlled by the Assistant Consolidation Officer and the land owned by the Village Society (the village as a whole) would be the responsibility of the *pradhan*.

After these preliminaries, the minutes of the meeting report that "The scheme for consolidation was prepared in the presence of the public with the help and advice of the members of the Advisory Committee and the advice of the people present and is as following. . . ." First, figures from the prerectangulation survey of the village land

are given, broken down into land owned by the Village Society, the Government, and the area available for redistribution. According to the new survey based on rectangulation, the village was somewhat smaller. The decrease was covered by reducing the area owned by each farmer in proportion to the size of his holding. This statement was followed by a detailed list of 10 parcels of old common land and then a list of 32 parcels of the new common land by purpose, area, and location. For example, "A path, *khasra* [plot] no. 152, area 3-14 [bighas], 6 *gathas* wide, from the village to the [paved] road has been left out [of consolidation]." Citing the appropriate section of the Consolidation Act, the report declared, "Today the rights of the public over the old paths and common land have been abolished and those same rights have come in force over the new paths and common land."

The meeting then took up the delicate matter of a significant area (174-2 bighas) of land under the Village Society that was illegally occupied. A list of the illegal occupants was appended that contained the names of some of the most important villagers. In addition, some people had illegally occupied privately owned land. An attempt was made to resolve the question of illegal possession in the consolidation process. Concerning illegal possession of private land, it was to remain in the name of the owner but possession was given to the illegal occupant. Illegal occupants of land of the Village Society outside the habitation site were given the land. Although this decision regarding common land might appear to reward illegality, in fact the occupants had a point. The individuals who owned the agricultural land also owned the common land in proportion to their holdings of agricultural land. Landowners frequently occupied common land bordering their fields, partly an expression of their belief that they had a specific share in the common land (S. Freed and R. Freed, 1987: 5).

The question of the illegal occupation of common land was by no means laid to rest by the consolidation process. It continued to fester, and in the village panchayat election of 1977, it was a hot political issue, chiefly because it was closely tied to the governmental policy of distributing some of the common land outside the habitation area, which could be used for agriculture, to landless people. Some 60 *kilas* were said to have been reserved for distribution to 60 families, 1 *kila* per family, upon payment of Rs. 125, a token sum. Landowners regarded such land as traditionally their property. Moreover, landowners saw a connection between the distribution of land to Harijans and the policy of reserving positions for them in employment and education. Landowners considered reserved places to be compensation for landlessness and believed that people should not, therefore, be given land while at the same time benefiting from reserved places. Nonetheless, encroachment was resented by most villagers, not only the landless but also by landowners who were not in a position to occupy village land.

Actor (a pseudonym), the man who served as pradhan prior to the election of 1977, adopted a policy of doing nothing with regard to the eviction of illegal occupants and the distribution of common land to the landless. The pradhan was the official responsible for taking these steps, but Actor did not want to be the focus of enmity, "So he just sat for five years," according to one landless villager. The landless contested the pradhan by forming a committee and filing a lawsuit. They claimed that the action was a success, but probably only with regard to plots within the

habitation area. They did have plots in the habitation site, but had not yet received agricultural land outside it.

The issue of common land was aggravated by the provision that if a privately owned field was uncultivated for a specific period, the village panchayat could annex it to the village common land. Sometimes land lay uncultivated because of excessive rainfall. The land was not really barren and could again be cultivated when the climate changed. In such cases, the panchayat could return the land to its original owner, but by that time other people were often cultivating it. The owner had to bring a lawsuit to recover it.

Actor preferred to keep the Government out of village affairs, believing that it brought mainly disharmony and disruption. However, he sensed that pressures were gathering around the office of *pradhan*, and that his strategy of doing nothing was no longer tenable. Harijans wanted their share of the common land. The Government and the times were on their side. Actor knew that it was time for him to leave office, "... while I still have good relations with everyone."

The three candidates in the election of 1977, all landowners—Probationer, Gentleman, and Frontman—had much the same idea of the *pradhan*'s role as did Actor, who was also a landowner. However, they rejected the inaction for which Actor was notorious, and Probationer and Gentleman vowed to distribute common land. But the experienced political strategist behind Frontman wanted to leave occupied village land in the possession of the landowners. He said that anyone who tried to buy votes by promising to give land to the Harijans would later be sorry (S. Freed and R. Freed, 1987: 48).

The man who ultimately won the election, Probationer, said, "The principal thing that I will do for the Harijans and Potters is to distribute land" (S. Freed and R. Freed, 1987: 47). As Probationer had occupied common land himself, landless voters had to wonder if this campaign pledge would be kept, but in the end, they decided that once he became *pradhan*, Probationer would see to it that all illegally occupied common land, including his own, was vacated and that a distribution of land to the landless would take place. The votes of landless villagers carried Probationer to a landslide victory. Because the Government and the courts would in all likelihood sooner or later force a distribution, it would seem an obvious strategy to wring political benefit from this probable development.

Probationer in fact did not distribute land to the Harijans after the election, but before the next election in 1984, when he was again a candidate, he distributed some residential land to some 20 to 25 Harijan families. The Harijans again supported him, but he lost the election by one vote. Our informant commented that Probationer managed to seize 11 acres (4.45 ha) of land belonging to the Village Society (S. Freed and R. Freed, 1987: 44–49, 70–72).

The next item on the docket of the May 15 meeting was the distribution of the land inside the new path that separated the habitation site from the agricultural land. This circular path (*phirni*), 3 *gathas* wide (24 feet, 9 inches), belonged to the Village Society. The new path enclosed an area 110 bighas larger than the old habitation site, which had to be enlarged to allow for an increase in population. Of the new 110 bighas, 52–19 belonged to the Village Society. The rest was agricultural land that belonged

to 21 landowners. There is a discrepancy in the figures, however, for the individual figures for the 21 landowners total 82-16 bighas rather than to 57-1 bighas.

The description of the distribution of land in the habitation site as summarized in the minutes is not entirely clear, although as the partition was worked out on the ground, it was doubtlessly well understood by the concerned parties. In brief, 101 landowning and 77 landless families would receive land. The landless would be given 2.5 *biswas*, to be distributed from the account of the Village Society. Landowners apparently could claim as much land as they believed that they needed but had to exchange agricultural land for it. The principle was that land in the old habitation site was an old possession, but for land between the old and new boundaries, agricultural land had to be exchanged. Land in the habitation site was valued at 32 annas, but villagers later recommended a reduction to 24 annas, which was evidently accepted, for we recorded a transaction of nine bighas of agricultural land for 6 bighas in the habitation site.

Various special circumstances were taken into account. Some landowning and landless families occupied plots, whose total area was 2-19 bighas, where they had built houses. They retained this land. The plots of landowners were "included in their accounts", which we interpret to mean that compensatory land had to be surrendered. The landless people already in possession of a plot would not be entitled to any additional plot. If dugwells or tubewells were included in the new habitation area and their owners had land adjacent to the path (*phirni*), then these landowners were given a path 1 *gatha* wide from their well to their land, such paths to be added to the accounts of the landowners. If all of a landowner's holding fell inside the new habitation area and there was a dugwell or tubewell on the land and no other landowner wanted to take it, such a landowner would be given at least 1 acre of land adjacent to and outside the path so that the well was not wasted. In the distribution of the new area inside the habitation site, a difference of 4 *biswas* either way would be considered minor and therefore not taken into account. Provision was made for manure pits for landless people outside the path (a total of 5 *biswas*). Landowners refused manure pits. A piece of land of 10 *biswas* was reserved for the potters to fire pots, and another plot of 1 acre was earmarked for them to dig clay. Land for a meeting house for the Harijans was set aside inside the habitation site. Paths from the old habitation site to the new main path would be 2 *gathas* wide and included in the account of the Village Society.

The distribution of agricultural land was organized around the bloc, the center, and the idea of "minor differences". Two principal blocs were recognized as mentioned above: *bangar* (bloc one) and *khadar* (bloc two). In addition, land valued at 6, 4, and 2 annas was considered wasteland and put in a separate bloc (three). Most barren land belonged to the Village Society.

The "center" of each farm had to be fixed for purposes of redistribution, the center being the place where a farmer had his biggest piece of land. In the redistribution, at least 50% of the old area of a farmer would be at the center. If the land of a small landowner fell inside the land of a big landowner, then the small landowner could be given land to one side of the big landowner. But the small landowner should suffer no loss. If the land of Farmer A surrounded that of Farmer B, whose center is in the

surrounded land but who has other land at a distance in which a second center could be recognized, then the redistribution would depend on the percentage of the holdings of each farmer in the impeded area. If Farmer A had a greater percentage of his land in the impeded area than Farmer B, then Farmer B would be given his land at his second center. The principle is that redistribution gives the larger percentage precedence over the smaller percentage. A landowner from another village, usually a neighboring village, who owned land in Shanti Nagar would receive land near the border of Shanti Nagar and the other village, on condition that it is not the center of any other landlord. Orchards were not included in the consolidation scheme and remained as they were.

A difference between a farmer's old and new areas of up to 3 standard bighas, for holdings from 1 to 25 bighas, and 5 standard bighas, for holdings of 26 bighas or more, was considered "minor". The minutes also note that in the distribution of land among rightful claimants, a difference of up to 5 standard *biswas* would be considered minor. We are not sure how the concept of minor differences functions in the redistribution except that such differences are said to be "unaccountable" and presumably not to be contested. However, to a farmer with, say, 18 bighas, 3 bighas are not minor. We suspect that, in practice, when the provision of "minor differences" was invoked, the amount of land in question was considerably less than the maximum figures of 3 and 5 standard bighas.

An effort would be made to give a landowner whose holding was from 1 to 25 ordinary bighas all his land in one place, preferably but not necessarily in the second bloc. If such a farmer owned a dugwell or tubewell in bloc 1 and his center was also there, then he could be given land in that bloc. He might also be given land in both blocs if his center was in one and his well in the other, with no other farmer being willing to take over the land with the well.

Farmers owning from 26 to 50 ordinary bighas would be given two pieces of land, one in bloc 1, the other in bloc 2. Such a farmer might also be given a third piece of land in bloc 3 if he owned a well there and no other farmer would take it. If someone else accepted this land and its well, then the farmer could receive compensatory land in bloc 2. Farmers with more than 51 bighas would be given three pieces of land, four at the maximum.

Solutions to the question of joint ownership of wells and land were specified. People who owned tubewells jointly (but not land) were each given land 1 *gatha* wide for a path and ditch connecting their land and the well, the area of the path to be included in their accounts. The joint ownership of land was less easy to resolve. Our interpretation is that to some extent ownership of land and its cultivation were treated separately. If several claimants with a single account farmed separately before consolidation and then separated their accounts, they were given land at different centers with their mutual consent. If consent were not forthcoming, the land would still be partitioned. A public meeting would be held at which their possessions would be attested and then the land distributed in accord with the identified centers. However, if these owners now with separate accounts were farming their land jointly and adamantly wished to have all of it at one center, then the account remained joint. It would seem that the consolidation officials wanted to bring ownership and cultivation into close

agreement. Joint cultivation meant joint ownership, and separate accounts made joint cultivation difficult owing to the distribution of land around different centers.

Land was to be exchanged immediately after the appropriate action was taken under the Consolidation Act 1948 (East Punjab). In areas with standing crops, fields were to be exchanged within three months after the harvest. The yield of sugarcane, a plant which remained in the fields all year, was divided, one-third given to the new owner. The fields were then exchanged. Money for dugwells and tubewells would be paid within the three-month limit. The path around the village (*phirni*) would be only 2 *gathas* wide on the south because of private gardens and orchards. Elsewhere, it was 3 *gathas* wide. This modification is yet another example of how the Government was careful not to upset existing arrangements more than was necessary. However, this modification was later challenged by other villagers. The meeting of May 15 closed with the announcement that objections to the consolidation plan could be raised at the court of the Consolidation Officer in Delhi either in writing or in person within 30 days.

One month later on June 15, a meeting was held in Shanti Nagar in which objections to the scheme were discussed and decided. Many people argued that the price of 6 and 8 annas for the *bani* land, where trees and shrubs grew, was too low and people were suffering losses. This objection could have meant that in trading fields, the owners of *bani* land were receiving inadequate compensation; it also might have meant that they were losing 6-anna land, reclassified as wasteland, without any compensation at all. After much discussion, the prices were raised to 8 and 10 annas, thus removing all *bani* land from the category of wasteland. The location of a pond was discussed and left as it was, but a major path was relocated. The value of land in the habitation site was debated. Originally, it was valued at Rs. 2, but the people wanted a reduction to Rs. 1.50. The concession given to the families with houses and orchards on the south side of the village was challenged. It was decided that the occupied land could be included in the *phirni*, thus making it 3 *gathas* wide everywhere, but only if the owners of the orchards were willing to cut their trees and surrender the land. In effect, the concession was left standing. Villagers asserted that a difference of 4 *biswas* in the habitation site was too large to be considered "minor" (see above) and recommended a reduction to 2 *biswas*. The question of pits for manure was raised. Some landowners apparently had second thoughts about refusing to accept land for manure pits. It was decided that the landowners who wanted such pits would be given land according to established procedures.

The people objected to the earlier provision (which seemed bizarre to us) that owners with from 1 to 25 bighas of land be given their new holdings preferably in bloc 2 (the *khadar* area). They insisted that such landowners be given all their land in bloc 1 (the more favorable *bangar* area). Furthermore, they wanted to establish the principle that land in bloc 1 should be compensated by land in bloc 1, and land in bloc 2 exchanged for land in bloc 2. However, if a landowner wanted to have all his land at one place, that could be accomplished by a recorded agreement, provided that the arrangement did not cause a loss to any other landowner.

The minutes note considerable argument and discussion about the distribution of land for residential purposes to Harijans and other landless people, but in the end

it was unanimously decided to give such land to the eligible people. The distribution of residential sites in villages had an effect on housing in Delhi. The Government gave people eligible for such sites who were living in government housing the choice of surrendering their city accommodations or losing the village residential site. They could not retain both. Several families who lived in Delhi decided to return to Shanti Nagar. The Government thereby reduced the pressure on government housing in Delhi and also probably emptied some illegally constructed houses in slums.

With the above amendments, the land consolidation scheme was passed. However, the consolidation officers and the villagers continued to hold meetings in Shanti Nagar concerning details of the distribution and aired further objections and corrections until mid-January 1972. The actual repartition of agricultural land began on July 4, 1971, and was completed on July 22. Plots for residential purposes were distributed to landowners at the end of August and to landless people at the end of September.

An important feature of the land consolidation project was that land revenue, that is, the yearly tax on agricultural land, would remain exactly as before consolidation. Neither an increase nor a decrease in a farmer's area would affect the land revenue that he had to pay. The National Commission on Agriculture (1976: 226) reports that in the Union Territory of Delhi, landowners were charged Rs. 20 per hectare on the cultivated area to help to defray the costs of consolidation (see also Bonner, 1987: 18). Neither the minutes of the consolidation meetings nor any of the people whom we interviewed mentioned such charges. The costs of consolidation may in the end have been treated as part of the ordinary expenses of public administration. Elder's (1962) detailed account of land consolidation in the village of Rajpur (Uttar Pradesh) makes no mention of payments by villagers to cover the costs of consolidation.

As is evident, land consolidation was a complicated process that involved fundamental changes in the social and economic geography of the village. The existing arrangement of village common land (paths, *phirni*, the placement of shrines, ponds, etc.) was summarily abolished and replaced by new arrangements. Privately owned farmland, the basis of a landowner's economic welfare, was reshuffled. Formerly landless families were given plots in the habitation site and promised farmland. These changes were not minor tinkering; they amounted to a major restructuring of important features of village life. Yet in contrast to other far-reaching legislation, such as the laws concerning the inheritance of farmland, which were generally resisted, land consolidation appears to have encountered few snags with regard to the implementation of most provisions of the legislation.

Land consolidation proceeded smoothly for several reasons. First, there were few architectural impediments. Houses and barns were concentrated in the habitation site; only one residence was located in farmland. Paths were unpaved; only the road to Narela road passing through Shanti Nagar and the feeder road to the habitation site were paved. Fields were not separated by fences, but only by low earthen ridges for paths and for channeling irrigation water. The only structures on agricultural land were the brick cabins for housing tubewell motors and a few dugwells. Thus, both common land and private land offered basically a clean slate. Existing rights that had to be preserved or at least taken into account were relatively few, principally the matter of tubewells.

Second, villagers played a prominent role in designing and revising the consolidation project. Government officials and villagers worked closely together, and no friction could be discerned either in the minutes of the meetings held in Shanti Nagar or in comments of villagers that we recorded some six years after consolidation. However, some problems did become apparent. The lanes and roads between fields were infringed by families with adjacent land, which led to quarreling. Such infringement is common practice in villages. Pradhans wanted the Government to settle such disputes, probably to avoid the enmity of the disputants. Barren land also could be a problem. As mentioned above, a pradhan could annex temporarily barren land to village common land. However, there was a provision that the village council had to return the land to its original owner when it again became usable. In practice, the real owner lost the land, which again led to disputes, fights, and court cases.

Third, the Government was careful to reassure farmers that they would suffer no loss. Vacated land was matched with land of equal value. Moreover, consolidation would not serve as an excuse for increasing land revenue. The only provision of land consolidation that upset the farmers was the distribution of land to the landless. Such land was taken from landowners in two ways. Common land belonged to landowners in shares even though it was undivided. Therefore such land given to the landless was a cost borne by landowners. Especially painful was the loss of temporarily barren land. Although landowners had a theoretical share of common land, they did not lose a specific tangible field, as was the case when a temporarily barren field was lost. The landowners did not vehemently protest the distribution of land in the habitation site, eventually voting unanimously in favor of the distribution. Farmland was another matter. Although the landless were to receive some, the distribution was apparently long delayed. In Kanjhawala, as noted above, distribution of land to the landless led to civil disorder. Even though Harijans and other landless people are in the majority in many regions or at least are a sizeable minority, the Government knows better than to push farmers too far too fast. A price might be paid at the next election. In the case of land consolidation in Shanti Nagar, the Government linked land consolidation, which the farmers welcomed, with land reform. The bitter pill was sugarcoated. However, sugarcoating bitter pills is not the chief governmental tactic. An astute, skeptical Brahman landowner summed up the basic governmental strategy for handling sensitive issues such as land reform, land ceilings, and the cancelation of rural debts: "The Government wants to keep both the landless and the landowners happy. The landless people think that they might get some land, and the landowners are happy to know that there will be no implementation."

Finally, land consolidation was an integral part of the Green Revolution. It had been carried out in many other villages, and the farmers of Shanti Nagar had visible proof that it was necessary. Tractors, tubewells, and high-yielding varieties of wheat and rice could not be used effectively without it. The Green Revolution put more money into the pockets of farmers and did not challenge any important social values or upset the traditional social structure of the village. Even though most landowning families in Shanti Nagar were in fairly comfortable circumstances before the Green Revolution, they were still interested in additional income.

COMPARISON WITH LAND CONSOLIDATION IN PEYRANE, FRANCE

Although we focus much more on ethnography than on theory, the testing of hypotheses and the evaluation of theories have a limited—but necessary—place here. In the past, we have devoted considerable time to hypothesis testing, for example, participation in the “sacred cow controversy”, the testing of the standard model of changing family types, and an appraisal of the domestic cycle in India (S. Freed and R. Freed, 1969, 1972, 1981, 1982, 1983).

Our experience with hypothesis testing is perhaps best illustrated in the analysis of changing family types in India both in 1958–1959 and 1977–1978. Some of the conclusions—or inferences—based just on the earlier data had to be modified in the light of data from the 1970s. We had to broaden the analysis, most specifically to include a close examination of demographic data. But that was not enough. We also had to take into account attitudes, emotional needs, and a few fundamental religious and social beliefs that are part of the Hindu ethos and shape the basic Hindu personality. In short, we had to broaden the ethnographic scope of the inquiry.

Comparison is essential in hypothesis testing and the evaluation of theories. We therefore present in some detail a comparison of land consolidation in Shanti Nagar and Peyrane. Land consolidation is one of the pillars of the Green Revolution. Although there has been no Green Revolution in France, the country has undergone a long history of land fragmentation, as has India, and has passed a series of laws to correct the situation that date to the First World War. The need for land consolidation is similar in both countries. Both countries have resorted to governmental action to achieve this apparently simple goal. This comparison of Shanti Nagar and Peyrane illustrates quite well the importance of cultural and social context in the diverging development of two programs designed to solve similar problems.

Like Shanti Nagar, Peyrane is a community of small family-owned farms. The farms were larger than those of Shanti Nagar; one-quarter were between 50 and 100 acres whereas only 6% of landholdings (1950s) in Shanti Nagar were that large. One-third of Peyrane’s land was unproductive, a figure that approximates the 39% of the land of Shanti Nagar that was out of production (S. Freed and R. Freed, 1978: 23). Land fragmentation was also a problem in Peyrane. The arable land was divided into a great many small irregular fields, just as in Shanti Nagar before consolidation. A rugged terrain was part of the problem, but the principal cause of land fragmentation was a network of inheritance traced in archives dating to medieval times.

When land consolidation comes to Peyrane, it will face complications arising from the different characters of the French and Indian countrysides. In France, houses and other structures have been built in the fields, there are many paved secondary roads, and some fields are enclosed by fences. An especially difficult problem is agricultural land classified as potential buildings sites (*terrains à bâtir*), that is, cultivated fields in urban agglomerations that will sooner or later be used for urban purposes. In Shanti Nagar, buildings were forbidden on agricultural land, roads and paths were unpaved, irrigation ditches were not lined, and boundaries between fields were marked by earthen ridges rather than fences. The map could be wiped clean and new

boundaries drawn without the complication of many structures of differing value whose locations could not be easily changed. The few dugwells had little worth, which made for easy negotiations, and trees could be cut down and removed. The Indian Government had a well-conceived program. The villagers knew the advantages of land consolidation and were eager for it.

The French government also had a land consolidation program, *remembrement* (regrouping of lands), designed "to help farmers trade [land] so that they may round out individual holdings and diminish the parceling up of property" (Wylie, 1964: 367, fn.). Although the goals of *remembrement* and *chakbandi* in India were similar, much else was different. To judge from Wylie's note, the initiative for land consolidation rested with individual farmers, who traded plots. The governmental program was tantamount to an enabling act. This seems to be the way that the villagers viewed the situation (fig. 4). In India, land consolidation dealt with the individual in the context of a comprehensive village adjustment. Once the village agreed to land consolidation, the possession of every farmer was modified so as to reduce village-wide fragmentation. This difference probably was partly due to the complication posed by houses and barns built on agricultural property in much of France.

In Peyrane in the 1950s, immovable property was a serious problem that could not be squarely faced until the reform of *remembrement* in 1975. Wylie offers a telling example. A farmer named Carette wanted to show Wylie the beautiful view from one of his fields. They had to go through another man's chicken yard to reach the spot. Carette's fields "were cut up by other fields belonging not only to Ruffat, but to Figeard . . . and to Ricard. . . ." Reacting to Wylie's amazement at the hodgepodge, Carette said, "If you think this is a mess, look at Ricard's house. . . . [It] belongs to him, but the barn to the left belongs to Figeard and me. That is, I own the middle part of the barn . . . and Figeard owns the two ends. . . . Look on the other side of the house. That shed belongs to Ricard's brother . . . but the lean-to at the end belongs to me'" (Wylie, 1964: 367). There was no comparable situation in Shanti Nagar.

Our comparison of France and India suggests that buildings on farmland can be a barrier to land consolidation. A diametrically opposite point of view is expressed in the *Journal Officiel de l'État Français*. The problem is viewed as the *lack* of buildings on farmland and their concentration in villages.

The concentration of farmhouses in villages has resulted in the dispersion of plots. Thus, a true consolidation will require the dispersion of farm buildings. It could not be otherwise.

While villages were born out of the need for a common defense, fragmentation is born from this grouping of houses so that the village concentration has been the cause and fragmentation the effect. . . .

For regrouping to be more effective, it will be necessary to reduce villages as much as possible and to disperse agricultural buildings among the fields, creating autonomous properties. [Journal Officiel de l'État Français, 1941: 1658]

This point of view makes no sense for Shanti Nagar. Building on agricultural land is tightly controlled, and houses are forbidden. Land consolidation worked



FIG. 4. Charles explains land consolidation to his two puzzled friends. "It's simple: We are going to make the following exchange. You, Bernard, give Albert the woods B1. Albert gives me, Charles, the cultivable land A1, and I give you, Bernard, the vineyard C1. Understand?" To which a sceptical Bernard replies with the well-known French saying: "That's how it is. Everyone to his trade [and the cows will be well guarded]." Cartoon reproduced from Peignot et al. (1999: 39) by the kind permission of François Frapar.

smoothly in Shanti Nagar. There was no need to break up villages, a step that would in any case be all but impossible. However, in the Vaucluse, many buildings can be found at the center of a property. This fact is taken into account in *remembrement* (see below, legislation of 1945).

There was another difference between the Vaucluse and the north Indian plain. In Shanti Nagar, productivity was the chief difference between fields. There was an added difference in the Vaucluse: aesthetic quality. Carette did not take advantage of *remembrement*. He said, "'Sometimes it works, but usually it doesn't. And do you

think I'd ever give up this field?" He and Wylie were standing on "an extraordinary spot where one could look out over the whole Apt valley and its surrounding Highlands—the Luberon Mountain, the village of Saignon perched high, the city of Apt hiding in its gully, the Perréal hill where the Romans once ward off an invasion by the Cimbri. . . . Who would trade this field for another, however productive the exchange might be?" (Wylie, 1964: 367–368).

Wylie's note about *remembrement* and the villagers' understanding of it seemed to refer to the situation as it existed until November 1918. Until then, governmental policy was confined to rectifying boundaries and encouraging mutual exchanges of land (Binns, 1950: 58–59). The exchange of plots is not the equivalent of land consolidation because there is no radical cure for fragmentation on a village-wide basis.

From 1918 to 1941, three laws dealt with land consolidation (Gastaldi and Vallery-Radot, 1976: 17). The only effective law was the one of March 4, 1919, whose application was limited to regions devastated by the First World War. The interested parties either redetermined the old boundaries between fields or made a new distribution of land. In effect, the war wiped the slate clean and permitted the kind of land consolidation similar to that obtained in Shanti Nagar where boundaries were easily erased and buildings presented no problem. However, this legislation did not solve the nationwide problem of land fragmentation in France.

The next law, which regulated consolidation operations in all of France, was enacted in March 9, 1941, and brought into force on July 7, 1945. The process outlined in this law broadly resembles *chakbandi* in Shanti Nagar. Consolidation involves the land of an entire commune. However, the administrative and legal features appear to be more complicated in France than in India (see the outline of procedures in Peignot et al., 1999: 67–69, 77). Operations are entrusted to a Communal Commission that includes both officials and landowners. The Communal Commission has the authority to take all necessary steps for making the use of land more efficient, thereby increasing its value. Its actions are controlled by a Departmental Commission, which functions as an appellate tribunal and is charged with hearing complaints. Landowners also have the right of appeal to the Council of State. The Commission appoints a surveyor to carry out the consolidation under the control and direction of the Department of Rural Engineering. Although the rights of landowners are subjected to the public interest, they are protected by the participation of landowners in the Communal Commission and by the fact that an individual landowner can appeal a decision (Binns, 1950: 60; Journal Officiel de l'État Français, 1941, 1942, 1944).

The legislation of 1945 was intended not only to reorganize small scattered plots into large well-conceived units, but also to bring together, as far as possible, land and farm buildings. Land for public needs, especially roads, was excluded from consolidation, as in Shanti Nagar. Specialized farms, such as orchards and vineyards, whose exchange was made difficult because of the nature of the cultivation, were excluded from consolidation and left in the hands of their original owners. This feature also had its analogue in *chakbandi*. The new grouping should be as compact as possible, organized around a center (*centre d'exploitation*), which was the place where a farmer's buildings were grouped, with no plot farther than 3 km from the center,

and have a value for cultivation equivalent to that of the previous holding (Binns, 1950: 61). Similar provisions were also found in *chakbandi*.

France enacted a law in 1975 that modified considerably the goals and arrangements of land consolidation outlined in the law of 1941 (1945). Though the initial reason for consolidation—that it was an indispensable prerequisite for the rational modernization of agriculture—was recognized as being more true than ever, another objective entered the picture: the general development of an entire region. Land consolidation was seen as the linchpin of an agricultural policy that would also serve broad social goals, such as the protection of the environment.

Agricultural policy takes into account the economic, environmental, and social functions of agriculture. . . . Its objective is to develop areas by systems of production adapted to their potential. It aims to preserve natural resources and biodiversity, to maintain the countryside, and to take measures for the benefit of all users . . . from farmer to hiker, from camper to hunter, from town and country planner to devotee of nature. Never before has the coexistence of the multiple usage of rural space been as delicate and—let's face it—as full of conflict. [Peignot et al., 1999: 15, 31; fig. 5]

Though *remembrement* is thus subsumed under broad considerations of land management and improvement, it nonetheless remains a necessary measure in the increasingly complex legislation concerning rural land policy.

The legislation of *remembrement* has evolved since its origin; and from a simple tool for the reorganization of fragments of agricultural land, *remembrement* has progressively become a complex means of solving the problems of the rural world which are not only those of the conditions for exploiting agricultural land but also those of using agriculture land and of respect for the environment. [Peignot et al., 1999: 15–16, 31]

Strictly from the point of view of land consolidation, the reform of 1975 introduced two principal changes. First, the problem of land that could be used for buildings (*terrain à bâtir*) was squarely faced. Second, the concept of monetary value (*valeur vénale*) was introduced. It was extremely difficult to handle the exchange of building sites in the context of rural land consolidation where exchanges of land operated on the basis of agricultural productivity without taking into account the monetary value of such sites. When in the past, it might have been impossible in some cases to redistribute building sites, the authorization to use monetary value for effecting redistribution solved the problem of achieving equitable valuations (Goujon, 1977: 41).

Evaluation was the key to consolidation in France as in Shanti Nagar. As *remembrement* evolved in France, immovable property and building sites could be exchanged on the basis of their monetary value. The case of agricultural land is more complicated. The key concepts are classes of land, consolidation points (*point-remembrement*), and center of exploitation, that is, the cluster of farm buildings. One must pay attention to the context in which the word *class* is used. It can mean large general



FIG. 5. The French policy of developing the countryside for various uses could create problems whose solution might only make matters worse. "Problem: the mountain bike course crosses the cow path and the hiking trail." Solution: "All we have to do is to build a traffic circle." Cartoon reproduced from Peignot et al. (1999: 31) by the kind permission of François Frapar.

classes of land, such as cultivable land or meadows, but also classes of land within the broad categories. Thus, cultivable land may be broken down into various classes of different value. In general, there would be five or six classes of land under the plow and three or four of pasture land. For each class, the Communal Commission chose a standard parcel. Then all the land in the "perimeter of consolidation" in each class was ranked in comparison with the standard. All evaluation was done in terms of the productivity of the soil without reference to its monetary value. Each rank was converted into points per hectare. The value of a farm was the sum of the points per hectare of the various classes of land comprising a farm times the acreage of each class (Vallery-Radot, 1968: 32–33). Thus, the value of a farm could be represented by a single figure. Also, the value of a field could be calculated. When land was consolidated, the value of a surrendered farm matched the value of the acquired farm. The complexity of land consolidation did not permit an exact equivalence between the value of a surrendered farm and that of the acquired farm, and so the law allowed a difference (*tolérance*) of 1% overall (Gastaldi and Vallery-Radot, 1976: 105). In rare cases, a cash payment might be authorized to balance an exchange of land. The usually uncompensated margin of error (*tolérance*) in land exchange in France was analogous to the concept of "minor differences" in the land consolidation in Shanti Nagar.

A farmer's land was consolidated around his farm buildings, his "center of exploitation". This was not always possible, but in any case, no plot was supposed to be more than 3 km from the center of exploitation. The laying out of the new system of roads was critical because each new plot must be easily accessible. The distribution of land was then demarcated on the ground. After further inquiry and modifications, the new distribution became final and was entered in the cadastre. At this point, no further legal challenges were permitted. The average consolidation operation took two years, twice as much time as in Shanti Nagar.

How has land consolidation fared in the Vaucluse? Not very well. The total area of the Vaucluse is 356,640 ha. As of Dec. 31, 1996, only 3861 ha had been consolidated, or 1% of the area. Even just taking into account the 160,980 ha under the plow, the prime land for consolidation, the figure rises to only 2% (Larousse, 1982: 15, 809; Peignot et al., 1999: 245). Modern land consolidation in France has been around for over 80 years, and a major reform took place in 1975. At the end of 1996, 48.7% of the useful agricultural surface in France had benefited from land development. Why has the Vaucluse lagged so far behind the country as a whole?

Probably interested parties, chiefly landowners and farmers, opposed consolidation projects, but why this may have been so is an open question. Wylie offers only hints. Factors other than the productivity of the soil may have been too important to ignore. His example concerns the aesthetic value of a particular field. Moreover, landowners may have felt that the benefits of consolidation would not have compensated for the problems of unravelling the overlapping ownership of farm buildings. Only a full-scale ethnographic treatment of land consolidation in a village in the Vaucluse could answer the question. Our comparison of Shanti Nagar and the Vaucluse is handicapped by the different kinds of data from the two areas. The Indian data are chiefly ethnographic. The French sources are basically accounts of legislation and of administrative procedures. We would have preferred to compare ethno-

ographies had we been able to find one for the Vaucluse that covered land consolidation and improvement in some detail.

Land consolidation in India and France began with a common problem and a similar goal, but, over the years, the two programs have become progressively dissimilar. Except for land reform—the distribution of small plots of land to the landless—which became part of land consolidation in Shanti Nagar and elsewhere, the program has not wandered far from its original purpose of agricultural efficiency, and its procedures have remained relatively uncomplicated. On the other hand, the comparable French project has blossomed into a large-scale, increasingly complicated program of rural development that features social goals far removed from a simple reorganization of fields. The Indian program was decentralized from the start, both from the point of view of legislation and administration. The French program is administratively decentralized, but the laws governing the program are national in scope. There is probably more of a strain trying to adapt a local situation to national law than to state law. Consolidation is simpler in Shanti Nagar than in France because of the general absence of buildings on farmland.

The most noteworthy difference between land consolidation in India and France is the role of the SAFERs and the FASASAs in France and the philosophy behind them. In the early 1960s, the French identified several problems that were viewed differently in India or not even seen as problems, the most important of which was that most French farms were too small for modern farming methods. An agricultural census in 1955–1956 showed that 1.2 million farms (55.8%) were less than 10 ha (Vial, 1969: 41). Land consolidation deals with fragmentation. A 10-ha farm might consist of 10 plots before consolidation and only 2 afterwards, but its size will still be only 10 ha. It was deemed desirable to put small farms on a sound economic footing by enlarging them, to help old farmers who could no longer work, to redeploy the excess agricultural labor force in occupations outside agriculture, to aid farmers willing to move from agriculturally overpopulated regions to underpopulated ones, and to resettle farmers who lost their land due to urban expansion or other nonagricultural developments.

The Government set up two organizations to deal with these problems. FASASA, *Fonds d'Action Sociale pour l'Aménagement des Structures Agricoles* (Social Action Fund for the Improvement of Agricultural Structures), arranged for a life indemnity to old farmers who agreed to sell their farms; special grants to members of farm families who became redundant and wished to train in a field outside agriculture; and aid to farmers willing to move from an agriculturally overpopulated region to an underpopulated one. India has no comparable authority.

The SAFERs, *Sociétés d'Aménagement Foncier et d'Établissement Rural* (Land Reform and Rural Enterprise Companies), are of particular interest. SAFERs are private, nonprofit organizations whose brief is to increase the size of farms and to help young people set up farms. Although private, they are controlled by the Government, which makes working capital available. They have the power to buy and improve land for resale. In short, they intervene in the French land market. A SAFER usually covers several *départements*, the main administrative divisions of France. There are 31 SAFERs for the 95 *départements*. From 1962 to 1978, SAFERs acquired more than

one million hectares and resold most of it, for they may retain acquired land no more than five years (Goujon, 1979: 26; Vial, 1969: 43). Vial (1969: 44) summarizes: "SAFERs . . . represent an original idea for collaboration between farmers, professional agricultural bodies, and Government Departments. Other countries are extremely interested in them, and are studying them closely."

The reform of SAFERs in 1979 marked a shift of emphasis. Goujon (1979: 28) notes: "While the most important action recognized until now was the enlarging of existing farms, the new law puts at the first rank of the missions assigned to SAFERs the installation of farmers, and in particular the installation of the young. . . . [T]he young farmer appears henceforth on the first rank before other priorities. . . ." Another feature of the new law was to make judgments about the sort of "equilibrium" that would be appropriate to different regions. For example, a region where farms were clearly larger than the average could be given priority concerning the installation of young farmers, thus achieving an equilibrium of generations, whereas in another region where the farms were much too small, the emphasis would be placed on an equilibrium of farm size, which would mean that some of the weakest farms would be snuffed out (Goujon, 1979: 28).

SAFERs and FASAs highlight interesting national differences between India and France. Policies specific to the two countries reflect three dominant factors: demography, the level of economic development, and social philosophy. India has a younger population than France. India is less developed economically than is France with a greater percentage of her population dependent on agricultural employment. Finally, India's political philosophy extols equality, and a strong effort is made to improve the circumstances of the weaker social elements and reduce the advantages of the stronger strata. Thus, India tries to limit the size of farms and aims to transfer land to the landless. France imposes no limit on the size of farms; rather she wants to reduce the number of small farms to the benefit of large efficient agricultural operations. France trusts the private sector more than does India. SAFERs would seem uncongenial in the Indian context.

These general factors in various combinations lead to specific policies. Both India and France regard small uneconomical farms as a problem, but the problem is treated differently in the two countries. In Delhi Union Territory, land sales that would reduce a farm below 8 standard acres are forbidden (India, 1960?: 12). However, the Government has no policy for buying land to enlarge existing farms. In France, a farmer may not subdivide his consolidated holding without the approval of the Departmental Consolidation Commission. In addition, the Government intervenes in the land market, buying and selling land through quasi-private SAFERs in order to enlarge existing farms. Farms are not limited as to their size.

Both countries have to deal with the problem of surplus agricultural labor. In France, labor becomes surplus when inefficient farms are absorbed by larger operations. Of course, many displaced workers find other employment, but the Government also takes an active role. Life indemnities are paid to old farmers who agree to sell their land; grants are paid to younger displaced workers who train for alternate employment; and aid is given to farmers who are willing to resettle in relatively sparsely populated rural areas.

In India, care of the elderly is a family matter. Old farmers do not sell land in order to have a retirement nest egg. Land passes to relatives, usually sons, who care for their parents. The retraining of "surplus" farm labor is not a concern of the Indian Government. People whose circumstances force a change of employment have to take care of themselves. The resettling of villagers who lose their farmland because of urban expansion or another reason is not a governmental problem in India as in France. Such villagers in the Union Territory of Delhi usually retain their homes in the old habitation site and seek other ways to earn a living.

Demography and level of economic development combine to produce different situations in India and in France. With an aging population, low birthrate, and attractive openings in the private sector for young workers, France is concerned with recruiting energetic young farmers. The Government does not look to agricultural employment for soaking up surplus labor. In developed countries, that is the role of industry and commerce. France is concerned with improving its agriculture in order to compete in the European Common Market.

With her youthful population and high birthrate, India has no shortage of young farmers and does not fear foreign competition. However, there is not enough non-agricultural employment to absorb workers displaced by the Green Revolution, if indeed such displacement takes place. Thus, the Government hopes that villagers will find enough local work so as not to be tempted to move to already overcrowded cities. That is probably the reason that so many studies of the Green Revolution focus on whether the new technology reduces the number of jobs and whether the new prosperity filters down to the most needy social sector. These are major concerns in India.

India's concern with equality and reducing poverty is expressed in agriculture by the policy of land ceilings and the redistribution of land. With 75% of her population living in villages where agriculture is the principal occupation, India's program of land consolidation aims both at more efficient agriculture and also at the amelioration of economic differences and poverty. In France, *remembrement* has evolved into a program of rural development. The French are not concerned with reducing economic differences in the context of land consolidation. Social problems are handled by other policies, such as adequate minimum wages and various governmental allocations, such as for unemployment, housing, and family support.

Chakbandi has been crucial for the Green Revolution. As a remedy for poverty or social inequality, it has counted for little—at least in Shanti Nagar. Most tenants have not been able to exercise *bhumidari* rights (a cultivator's right to land ownership), and common land and/or surplus farmland have not yet been redistributed. The landless would like their promised acre of common land, but any earnings from it would be only a supplement to salaried employment. Shanti Nagar may be atypical in that the Delhi urban agglomeration is near at hand. However, in a more isolated village, Piparsod in Madhya Pradesh, some landless were given from 3 to 4 acres in the mid-1970s. Chambard (1980: 42) observed that people who received these allotments did not do any better than a previous similar group in 1960–1961, over half of whom abandoned agriculture after several years, more indebted than before the experience. The French policy of separating agricultural efficiency from programs of social welfare is probably more rational than India's effort to combine the two functions.

One commendable feature of the French law is that it attempts to insure that the results of consolidation are conserved. The Departmental Consolidation Commission must approve subsequent subdivision of consolidated holdings (Binns, 1950: 62). Similar laws—the East Punjab Holdings (Consolidation and Prevention of Fragmentation) Act, 1948, the Delhi Land Reforms Act, 1954, and the Delhi Land Holdings (Ceiling) Act, 1960—are in effect in the Union Territory of Delhi. The Government has determined that there is a minimum area—8 standard acres—that can be cultivated economically. This minimum area is called the “standard area” or an “economic holding”. A holding less than the standard area is deemed a fragment. Land cannot be transferred or partitioned to create a fragment (Delhi Administration, 1976: 601, 609, 612).

Bonner described how the law works in Punjab:

[T]he state government is empowered to determine the minimum area that can be properly cultivated as a separate plot. This area, termed the standard area, varies according to the quality of the land and is computed in the same way as consolidation. Any parcel of land less than one unit of the standard area is considered a fragment, and, according to this Act, it is illegal to transfer or partition any plot leading to the creation of a fragment. Any owner who wishes to sell a fragment must have its fair market value appraised by a government official. After determining the market price, it must be offered for sale to the owners of contiguous plots. If they do not agree to purchase the land . . . the land is purchased by the government. [Bonner, 1987: 150]

The farmers of Shanti Nagar know that a similar measure was then current. A Jat farmer told us, “A farmer with less than 35 [standard] bighas is not permitted to sell a part of his land although he can sell all of it. Over 35 bighas, there are no restrictions on sales. The Government does not want farmers with less than 35 bighas of land to make small sales. Such sales help neither the buyer nor the seller very much. And the Government does not think that agriculture will be done properly on small plots.” Our informant made no mention of inheritance, which is the principal cause of fragmentation. In any case, this interview took place in February 1978 and consolidation dated only to 1971. There had not been enough time for many problems to arise from the legislation that was then current.

In France, applications for consolidation increased considerably after 1943, the year in which the first credits were included in the budget of the Ministry of Agriculture. The state meets the expenses of consolidation. After the completion of consolidation, 20% of its expenses are recovered from landowners. Most of the surge of applications were for departments north and east of Paris where the average plot was less than 1 ha and there had already been much consolidation under the law of 1919. In other regions where consolidation is practically unknown, such operations are less numerous and primarily for demonstration purposes. “[I]n view of the great diversity of the lands of France, if results are to come up to expectation, the general principles established by the law must be freely adapted to the particular conditions of each region” (Binns, 1950: 63).

India, with its decentralized system of land consolidation where each state has its own law, is better adapted to take local conditions into account than is highly centralized France with one law for the entire country. Nonetheless, progress has been uneven in India as in France. Consolidations programs are nearing completion in the states of the northern plains (Punjab, Haryana, Delhi, and Uttar Pradesh), but there has been less progress elsewhere (Bhalla and Tyagi, 1989: A-46; Bonner, 1987: 20).

Because tractors and land consolidation went hand in hand in Shanti Nagar, we reached the general conclusion, as have so many others, that small scattered fields are incompatible with modern mechanized farming anywhere. Although this conclusion may have to be qualified in particular cases in the short run, it is almost surely valid in the long run. Peyrane in the 1950s offered an example of a short-term trend that would seem to indicate that tractors can be used with reasonable effectiveness in small fragmented fields. In Peyrane in 1950, there was scarcely a tractor in the commune. In 1959, without land consolidation, individual farmers owned 57 tractors. Wylie believed that this development made little economic sense. He wrote, "Modern farm machinery cannot be used efficiently in small plots of land, as many farmers who bought equipment on credit have found. Their operations are to their dismay so inefficient that they cannot pay for the machinery which was expected to pay for itself" (Wylie, 1964: 366).

So how does one account for all the tractors? His friend Carette, the farmer with the field offering a magnificent view, complained: "I used to be able to look at this view while I cultivated the vines. . . . My horse knew the way. Now I drive a tractor and have to keep my eyes glued on the row all the time. That's progress!" (Wylie, 1964: 368). He disapproved of his son's desire to farm. "'Maybe he'll change his mind when he starts driving the tractor around all day, listening to the putt-putt and smelling the fumes of the exhaust.' Why did you buy a tractor, then? I asked. 'I had to. I couldn't get any help, so I have to do most of the work myself. This way I can get the work done, at least.'" (Wylie, 1964: 366-367).

Carette and the other farmers of Peyrane wanted to continue to do business much as they had always done. It is the common problem of small inefficient producers and shopkeepers trying to survive when times have changed. "It is sad to realize that Carette's economic situation will inevitably get worse. Besides wasting too much time and energy going from field to field with his equipment, he wastes the potentiality of the equipment because his fields are too small for it to be used most advantageously. . . . It is difficult to see how he can meet the growing competition of the Common Market and eventually of the world market" (Wylie, 1964: 368).

Wylie noted a conflict, exacerbated by the Second World War, between the diversity of crops needed for self-sufficiency and the specialized crops that could make a small farm profitable. After World War II, farmers lost some confidence in the future. The best crops for Peyrane are vegetables and fruits, especially grapes and apricots. But in the 1950s, there was an overproduction of wine and the government forbade the planting of new wine grapevines. Apricot trees take years to bear fruit. "Who knows if we and our children would be here by the time they started to bear?" was a common reaction. A veteran of the war expressed a general point of view: "Plant an apricot orchard so the Russians and Americans can use it as a battlefield? Thanks.

Not so dumb" (Wylie, 1964: 33). During the war, the farmers best able to care for their families were those practicing the old subsistence economy based on wheat and sheep. In 1950, 14% of the best soil in the commune was still planted in wheat, a kind of disaster insurance.

France is now two generations removed from the Second World War, and the possibility of war in western Europe is remote. Confidence in the future is probably greater now than in the 1950s, but economic problems rooted in inefficient land use and market competition are not solved by optimism alone. Eventually land reform and developments in finance and marketing will lead to a new, stable pattern. But until then, there will be "... more heartbreak and social unrest than there already has been, for the Carettes of France will not give up without a struggle" (Wylie, 1964: 368).

The farmers of Shanti Nagar were a major step ahead of their counterparts in the Vaucluse. They have smoothly gone through the process of comprehensive land consolidation, which was the key to the rest of the Green Revolution—the tubewells, tractors, and new seeds. In Shanti Nagar, subsistence farming and production for the market are readily combined, for wheat, the basic food crop, is also a major commercial crop. Moreover, the fields of Shanti Nagar were twice as productive as those of Peyrane. In Peyrane, the proportion of wheat harvested to seed was 5 to 1, only 7 to 1 even in the best years (Wylie, 1964: 16). In Shanti Nagar, it was about 13 to 1.⁸

Vegetables, especially tomatoes, are the current specialty crop. Truck farmers do not face competition from large producers; vegetables are well adapted to small-scale farming. Although many truck farmers have only an acre or two in tomatoes, the vegetable business from a regional point of view is a large enterprise. One has only to visit the fields in the late afternoon and, very early the next morning, go to the Delhi Vegetable Market to grasp an idea of the scope of the activity. Each family quickly picks its tomatoes, packs them in baskets, and places them on the edges of lanes where men with carts or small trucks pick them up and take them to market during the night. Before sunrise the next morning, farmers take the bus to the market where they sell their vegetables through commission agents. The activity is very well coordinated even though there are thousands of producers, drivers, porters, and agents. It functions as smoothly as a large well-managed commercial farm.

The problems and complaints of the landowners of Shanti Nagar are not those of the Vaucluse. They have to do chiefly with governmental policy. The land ceiling act, bhumidari rights, and the distribution of land to the landless are causes of insecurity. In one way or another, some of their land could slip away. Farmers of Shanti Nagar do not fear price competition from a supranational organization like the Common Market in Europe. Instead, the Government squeezes their profits by controlling the prices of basic food grains, keeping them low, while allowing the farmers' costs to rise. It is a way of taxing the countryside for the benefit of cities and the industrial sector. Some such arrangement is perhaps necessary, as land taxes are ludicrously low and farmers in general pay no income tax.

A noteworthy difference between Shanti Nagar and Peyrane is their location. Shanti Nagar is near the megacity of Delhi, perfectly located for truck farming. Moreover, an energetic farmer can combine urban employment with farming. There is no large city near Peyrane. Produce can still be sent to major urban markets. Asparagus

from Peyrane goes to Paris by express train for sale the next day (Wylie, 1964: 31). But transport is not as cheap and as easy as from Shanti Nagar to Delhi. However, all the advantage does not lie with the farmers of Shanti Nagar. The Vaucluse is relatively isolated, the countryside is beautiful, and, for a time, land prices were cheap. When other circumstances are right, these features can be marketed.

By 1959, the charm of the Vaucluse had become an economic factor. City people had discovered its picturesque houses, its sun, and its cheap properties. It became a resort region, and the cost of land skyrocketed. Wylie (1964: 342) reports some of the prices: the owner of a windmill once worth \$90 turned down an offer of \$3000; vacant lots unwanted at \$150 were worth \$2000 10 years later. High-speed trains and airplanes make the Vaucluse more accessible to Parisians—and rich foreigners—every year. With a quaint hideaway in the Vaucluse, “Parisians could satisfy the traditional French urge to play at being peasants” (Wylie, 1964: 341). Writing of another village in the Vaucluse, Mayle observed that “People are attracted to an area because of its beauty and its promise of peace, and then they transform it into a high-rent suburb complete with cocktail parties, burglar-alarm systems, four-wheel-drive recreational vehicles, and other essential trappings of *la vie rustique* [country life]. I don’t think the locals mind. Why should they? Barren patches of land that couldn’t support a herd of goats are suddenly worth millions of francs” (Mayle, 1991: 112).

Did the Vaucluse foreshadow Shanti Nagar? Probably not. Shanti Nagar is too close to Delhi to serve as a retreat from hectic urban life. Situated just a few miles south of Narela, it is still within the rural area of Delhi Union Territory, but its rural character will be continually attenuated by the spread of the Delhi agglomeration (fig. 6). The Census of India’s definition of an urban agglomeration is, in part, “A city and one or more adjoining towns with or without outgrowings, all of which form a continuous spread” (Nath, 1991: 2937). Nath (1991: 2939) comments, “The Delhi urban agglomeration had expanded during the same 20-year period [1971–1991] to cover most of the area of the union territory of Delhi, absorbing within it almost 150 villages of 1971 besides, 23 towns, and was expanding by 1991 into the adjoining states of Uttar Pradesh and Haryana.” The spread along major highways has reached the point where two cities situated at distances of 20 km and 30 km from Delhi would become part of the Delhi urban agglomeration by the late 1990s. A danger of a spreading agglomeration is that agricultural and other lands will be converted to nonagricultural uses—residential, industrial, or commercial—as often happens when areas designated for public use, for example schools, are sold to developers. A village friend wrote to us in 1997, “The village scenario has changed *in toto*. More buses are plying the roads. The land has been acquired by the Government and the concrete jungle has been built up throughout the area. Because of the population, India’s biggest problem!” Such a place can never be a satisfactory retreat from urban stress.

To what extent is the concept of path dependence, with its components of incumbency and contingency, useful in the analysis of land consolidation in India and France? Path dependence fits the Indian situation very well. The outcome of the process could be predicted from an analysis of the initial conditions. Incumbency—or inertia—was overcome by the needs of the Green Revolution and of mechanized farming. The path laid out in the relevant legislation well suited the facts on the

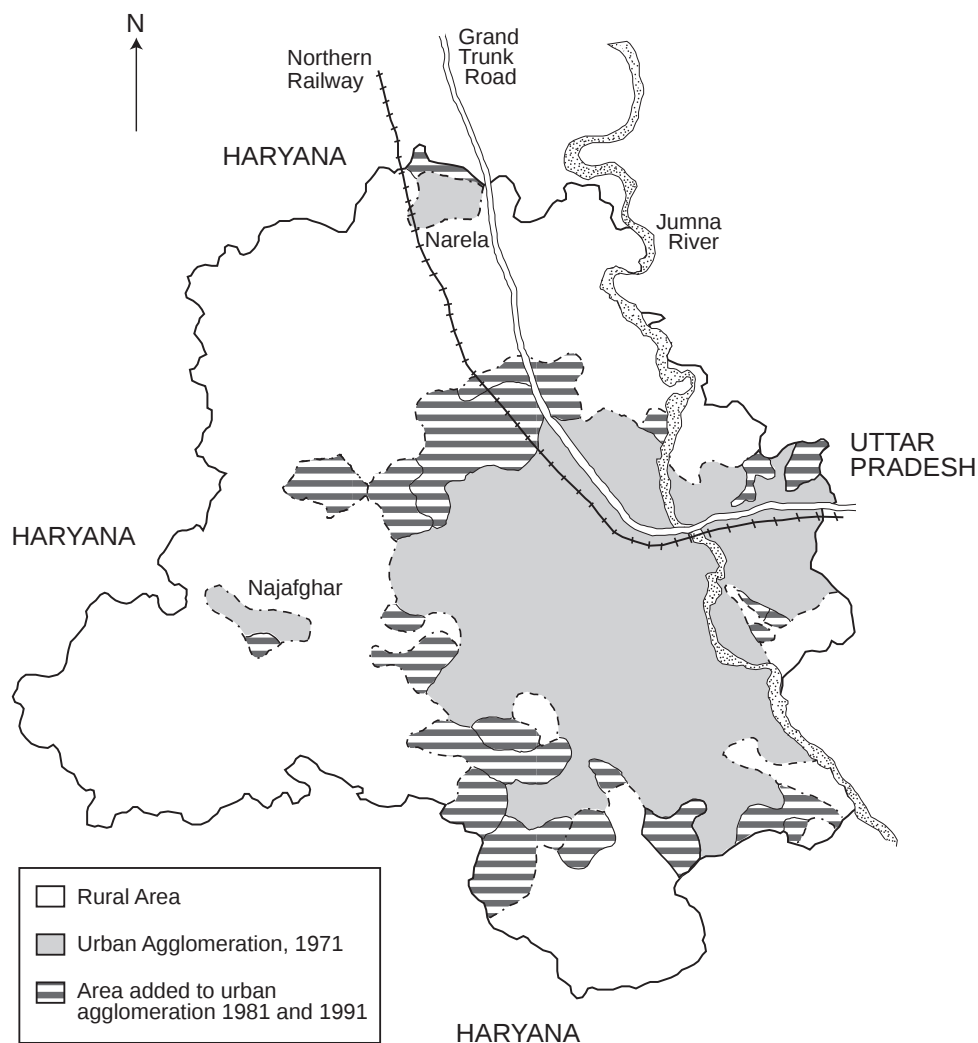


FIG. 6. Delhi urban agglomeration in 1971 and areas added in 1981 and 1991. Source: Provisional population totals: rural-urban distribution. Census of India 1991, series 1, paper 2.

ground. The law served as an algorithm for arriving at the final state of affairs. Even land reform as an adjunct of consolidation might have been foreseen, for the idea was much in the air at the time and considered inevitable, though we do not know its exact legal status in 1970–1971. In any case, contingency was not much of a factor in land consolidation in Shanti Nagar. There were no surprises.

The situation in France was different. There would seem to be no algorithm designed on the basis of the law of 1945 that would lead, step by step, to the situation of the 1990s. As in Shanti Nagar, incumbency was overcome by necessity. Mechanized farms needed large fields to derive the maximum benefit from modern machinery, and competition from the European Common Market required efficiency to minimize costs. But the reform of 1975 could not have been predicted, although in

hindsight it is clear that the problem of “building sites” had to be faced and “cash value” had to be used more than it had been up to that date. However, the shift of emphasis in 1975 from land consolidation to comprehensive rural development in all its aspects was a discontinuity—a new deal. Though contingency was of minor importance in the land consolidation of Shanti Nagar, it has been a major factor in *remembrement*.⁹

In human affairs, we are almost always dealing with contingency, a confluence of unsuspected factors leading to results that could not have been entirely predicted from the initial state of a system. That is one reason why functional analysis remains a powerful analytical method in social science. It deals with the interconnections of diverse elements. There is always an element of chaos in life, not that what goes on is irrational but that it is simply unpredictable.

At this point, it is well to note a difference between Chayanov’s Russian peasants of the first quarter of the 20th century and Shanti Nagar farmers in the 1970s. The privately owned family farm was the economic base in both places, and family members worked the land. However, the Shanti Nagar farmer was more of a capitalist than his Russian counterpart. Chayanov’s farmers sought an annual income sufficient for basic needs and did not make much of an effort past that point. The farmers of Shanti Nagar need money for ceremonial expenses, want money for investments, and are definitely interested in luxuries, such as television sets and radios. Their counterpart in Russia would probably be the kulaks.

American advisors operating in India have sometimes been accused of seeing a Midwestern American wheat farmer inside the north Indian peasant. The observation is not so silly as it might seem. The north Indian farmer thinks in terms of costs, loans, mortgages, prices on the urban market, the latest equipment, newly developed seeds, scientific soil testing, and so on. A similar development has taken place in Peyrane. Wylie wrote (1964: 31) that the farmers of the commune, most with no more than an eighth-grade education, speak of soil chemistry, the selection of seeds and fertilizers, current market prices as learned from the radio, and planting seasons based on the advice of seed companies and agricultural agents. In Shanti Nagar, one is dealing with a rural bourgeoisie. Chayanov believed that the surest way to misunderstand the peasant family was to view the family farm as a capitalist enterprise (Thorner, Kerblay, and Smith, 1966: xiii). An equally bad mistake would be to ignore the business aspect of the modern family farm.

Chayanov devised his theory for the peasant family taking into account all its economic activity. Unpaid family labor is a large part of the family economy. Chayanov emphasizes, therefore, that standard economic theory cannot be applied to the family farm because profit cannot be calculated. The calculation of profit requires three factors: wages, materials, and rent. A family farm in Shanti Nagar may hire some labor, but family members usually do much of the work. The problem of assigning a wage rate to family labor defies an acceptable solution. As Chadha (1979: 8) observes:

Usually the market price serves satisfactorily as the opportunity cost of a family owned resource. Since, however, a very large part of the input human labour does not pass through the market, it is conceptually absurd

to think of a genuine market price of labour and hence the opportunity cost of family labour. . . . All attempts made to impute wage rates to family labour, most commonly the average wage paid to farm servants, are based on unrealistic and arbitrary generalisations, possibly unrelated to socio-cultural *milieu* in the rural Punjab.

Because of unpaid family labor, the peasant family can continue farming year after year under conditions that would bankrupt a capitalist farm (Thorner, Kerblay, and Smith, 1966: viii). Other factors that contribute to the endurance of the hardscrabble farm are a vanishingly small tax on land (land revenue), the general avoidance of income tax on the farm income of peasant farms, the absence until recently of much alternate employment, and the emotional tie of the peasant to the land.

TRANSFER OF TITLE AND MORTGAGE

The Green Revolution and a developing economy changed the way that people managed their land. A significant change had to do with the reasons for mortgaging land and the identity of the lenders. Farmers sometimes needed to borrow money to purchase expensive farm equipment, especially tractors and tubewells, which were necessities for farming as practiced during and after the Green Revolution. In such cases, farmers mortgaged land to banks rather than to village moneylenders, who were the chief source of liquidity before the Green Revolution. In pre-Green revolutionary times, people mortgaged land to local moneylenders for relatively small sums needed to meet daily living expenses, but not for capital investments. Other changes took place, notably a change in attitude concerning the sale of land. After the Green Revolution, farmers were more willing to sell land than before, a change reflecting the general economic development that accompanied the Green Revolution. Large landowners also feared the land reform legislation that was being implemented at about the time that the Green Revolution took hold. These trends and others are revealed by close analysis of land records accompanied by interviews with well-informed villagers.

Mortgages of land, mortgages redeemed, and the transfer of land ownership (or the right to its cultivation) owing to inheritance, sale, exchange, gift, and bhumidari rights are recorded in the *Intkal* (mutation) register. We analyzed the entries from the *Intkal* register for a 10-year period mainly in the 1950s (May 30, 1948, to March 28, 1958) and for an 8-year period in the 1970s (October 25, 1969, to August 18, 1977). No gifts¹⁰ and just one exchange were recorded; the rest of the entries concerned only mortgage, inheritance, sale, wills, and bhumidari rights (table 3).

We paid particular attention to land transfers that were basically voluntary, that is, mortgages and sales. Although such transfers concerned the circumstances and motives of specific families, they were nonetheless often typical of the village at the time. Thus, comparison of land transfers of the 1950s with those of the 1970s offers the possibility of revealing important changes in the village economy. With the mutation records in hand, we questioned villagers about cases that appeared to be of particular interest.

TABLE 3.

LAND TRANSFERS

TYPE	1948-1958		1969-1977	
	NUMBER	PERCENT	NUMBER	PERCENT
Inheritance	18	28	21	34
Mortgage	11	17	6	10
Mortgage redeemed	25	38	3	5
Bhumidari ^a	0	0	10	16
Sale	6	9	18	30
Miscellaneous ^b	3	5	0	0
Will	2	3	2	3
Exchange ^c	0	0	1	2
Total	65	100	61	100

^a*Tabdil Hakuk Bhumidari* (change of title through occupancy by cultivator).

^bTwo of these were "corrections" and one had to do with a missing owner.

^c*Tabdil Malikiyat* (change of ownership).

Source: *Intkal* (mutation) register.

The inheritance of rights in land following a death was of course not voluntary. Two inheritable rights were recognized in the mutation register: ownership and cultivation rights. Although ownership and cultivation were often combined in the same individual, they were in fact separate. A farmer who was not the owner of a field but had the right of cultivation could leave it to his heirs, just as the owner left title to his heirs. The inheritance of cultivation rights was recorded in the mutation register. About half the cases of inheritance in the 1950s concerned the right of cultivation.

The inheritance of title was of more interest than the inheritance of cultivation rights because it was potentially much more contentious. Title usually passed to the next generation, the details of the transfer governed by the most recent land legislation. However, on some points, current law was in conflict with traditional law. For example, daughters could legally inherit a share of their fathers' property under current law, but they were not heirs under traditional law or long-established custom. In such cases, custom took precedence over land reform legislation, so that, in fact, daughters did not inherit land. Widows did inherit the land of their husbands, but when they died, the land passed to their sons or to the male relatives of their husbands, if there were no sons. All of this was well understood, and usually there were no problems. In cases where trouble was a possibility, villagers had recourse to wills or to bhumidari rights. In the latter case, the desired heirs were entered in the land records as the cultivators, who then claimed the land, thus excluding other claimants. There were only two cases of inheritance by will in each of the periods under study.

The Green Revolution substantially changed the way that villagers handled transfers of land. Types of transfer common in the 1950s became rare in the 1970s; and methods of land transfer widely used in the 1970s were rare in the 1950s or not used at all. As one would expect, transfers by inheritance were roughly equal during the two periods, for death takes no holidays. However, the mortgaging of land and its redemption, amounting to 55% of the 65 entries during the 1950s, had dwindled to only 15% of the 61 entries in the 1970s. On the other hand, transfers through *bhumidari* (occupancy) right, which did not have a single entry in the period surveyed in the 1950s, accounted for 16% of the transfers in the 1970s. Moreover, there were three times as many sales of land in the 1970s as in the 1950s. Inheritance and mortgage were the most common types of land transfer in the 1950s; inheritance, *bhumidari* right, and sales were dominant in the 1970s (table 3).

In the 1950s, mortgage and mortgage redeemed were by far the dominant voluntary methods of transferring rights in land. These two categories, which are tantamount to a single category, amounted to 82% of the voluntary transfers. Mortgages often had their origins in simple loans. The customary monthly interest rate charged by private moneylenders was about 1.6% (one pice per rupee, or 1/64th of a rupee).¹¹ If a borrower was unable to meet periodic interest payments and the interest began to accumulate, he could evade compound interest and stabilize his steadily mounting debt by mortgaging some of his land to his creditor (see also Darling, 1978: 188). Under this arrangement, the creditor had cultivation rights in the land. The income from cultivation served in lieu of interest on the loan. Such an arrangement could continue for years until the mortgagor repaid the principal and thus reclaimed his land. The mutation register showed more than twice as many mortgages redeemed as mortgages. The excess of redemptions over mortgages may have reflected a period of increased prosperity and also the reluctance of landowners to allow others to have any rights whatsoever in their land because they might lose it under the terms of the land reform legislation.

In general, land was mortgaged to pay daily living expenses and/or ceremonial costs. These expenditures reflect the underdeveloped economy of the 1950s. We learned of no cases of the mortgaging of land to obtain investment capital, to purchase land or expensive farm equipment, to build a house, or to improve land or other property. These motives were common in the 1970s, but the scenario involved the sale of land rather than its mortgage. That is, land was sold to pay off a debt. The problem with a mortgage to another cultivator was that it might lead to the surrender of cultivation rights in lieu of interest payments, which, if continued long enough, could open the door to the mortgagee's claim to title on the basis of occupancy rights.

From the early 1950s when land reform was clearly on the horizon, people began to be very careful about leaving cultivation rights in the hands of the same mortgagee for more than a few years. For example, a Jat resident of Delhi who owned land in Shanti Nagar mortgaged 5.8 bighas for Rs. 2500 on May 18, 1951, to a Jat who lived in a neighboring village. The mortgagee was listed as the cultivator. Two years later, July 28, 1953, the landowner redeemed the mortgage, listing himself as the cultivator. That very day, he mortgaged the same parcel of land for the same amount of money to a different farmer, who was listed in the mutation record as the cultivator.

Thus, the first mortgagee was dismissed before occupancy rights could be established. The process of establishing occupancy rights began again with the new mortgagee.

A similar transaction took place on the same dates but with different people. Again, Jats who owned land in Shanti Nagar mortgaged 13.8 bighas to Jats in a neighboring village for Rs. 7200. The mortgagee was entered in the record as the cultivator. Two years later the mortgage was redeemed with the landowner listed as the cultivator. The land was mortgaged on the same day to another farmer, but the money involved this time was Rs. 11,200. The landowner in this case not only protected his land also but took advantage of its increased value. The new mortgagee was listed as the cultivator.

The following transactions were typical of the 1950s. A Brahman with a small landholding, 30 bighas, mortgaged 2.3 bighas to another Brahman for Rs. 267.50. His first wife had died, his remarriage had been expensive, and the income from his land was modest. He had an ongoing account with the mortgagee, a moneylender. Finally, the time came when he was no longer able to meet the interest payments on his loan. To avoid the mounting interest, he mortgaged his land. When his son grew up and obtained a city job, the mortgagor redeemed the land.

In 1954, a Brahman redeemed a mortgage that was so old that he was in danger of losing title to his land. He had mortgaged 18.7 bighas to a Brahman from another village for Rs. 660. The mortgagee was listed in the mutation record as the cultivator. The debt had eventually grown to Rs. 2800. The landowner had been squeezed between high marriage expenses and low income from agriculture. In those days, little money could be earned in agriculture. Although his income from agriculture had risen substantially since his land had been mortgaged, he still did not have enough money to redeem the mortgage. Therefore, three local Brahmans each lent him Rs. 700, and the mortgage was redeemed. The three Brahmans, who acted to prevent the loss of the land to an outsider, were repaid in the next few years.

This particular redemption required two separate transactions, each one duly noted in the mutation register. The original mortgagee who held the cultivation rights had died. His son inherited the cultivations rights, but no entry was made at the time of the father's death. When the mortgagor wanted to redeem the mortgage, the record had to be brought up to date. The two entries were made on the same day, first the inheritance, then the redemption.

After the death of his wife and children, a Jat Farmer who could not work very hard was compelled to borrow money for his living expenses. For Rs. 143, he mortgaged a parcel of land, 4.9 bighas, to two families of local Jats, each family taking equal shares. He mortgaged another 8.3 bighas to some Jats from a neighboring village for Rs. 525. The mortgagees had cultivation rights. It was quite common for the same individual to be involved in several mortgages as either mortgagor or mortgagee. The landowner was a resourceful man. He entered into an agreement with a strong young Chamar Leatherworker to farm the rest of his land in return for a yearly compensation. Thus, he improved his circumstances and was able to redeem both mortgages on the same day in 1952.

Villagers attributed the economic difficulties of some farmers to a taste for high living. A Jat Farmer, a rather bizarre man by village standards and considered also to

be a bit foolish, had mortgaged land to a Jat living in a neighboring village. He redeemed this mortgage in 1957. Our informant commented, "This land was probably mortgaged around 1920. He bought a car then and had a driver. He was living far beyond his means. When you do this, you run into debt, and sooner or later, with the interest mounting, you put the land under mortgage." He was also involved in the redemption of two other mortgages in the 1950s, but the details are not clear in the mutation record.

A Brahman was reputed to have had a similar history. He had expensive habits. He bought a mare, good clothes, generally enjoyed life and did not work. He mortgaged land to a local Brahman landowner and moneylender. Later he redeemed this loan and mortgaged the same land for more money to two Brahman brothers from a neighboring village. He received Rs. 950 for 10.3 bighas, half the money from each brother. Later he reformed, started working and redeemed both mortgages in 1954.

Two Jat brothers and the son of a deceased third brother had mortgaged 16.9 bighas of land to people in a neighboring village. The mortgage was redeemed in 1956. At the time of the mortgage, the three brothers were probably living jointly, but they had divided into three families by 1958 when we took our census. The reason for the mortgage was "general weakness", as our informant phrased it. They were involved in prolonged litigation with other villagers, and were also faced with heavy marriage expenses. We counted at least seven daughters—our informant said as many as nine—whose marriage expenses had to be paid. The daughters were unequally distributed among the brothers. One of the mortgagors had five daughters, and his son added two more to the family. The unequal distribution of daughters among the nuclear families composing a joint family, and the attendant financial obligations which must be shared equally, can be one of the factors leading to the breakup of joint families.

Some villagers spoke of "informal" mortgages within a lineage (*kunba*). When land was mortgaged within the lineage, the transaction was informal and was not always recorded in the government records. One informant said that loans could be arranged on more favorable terms from families of one's own lineage than from outsiders. He claimed to have borrowed as much as Rs. 1000 on which he had not been required to pay interest. Generally no interest is involved when money is lent between relatives or friends.¹² One of our informants, the son of a deceased moneylender who himself still made an occasional loan, said that no interest is charged for a loan of six or so months to a relative or friend. If for a longer period, a nominal rate of 1% per month might be charged. He said that he did not like to lend to relatives, by which he meant relatives by marriage. You cannot charge interest and you have trouble recovering your money. However, where personal relationships are concerned, the debtor generally wants to repay. Such being the case, there would seem to be no reason to mortgage land to secure a loan or to take cultivation rights in lieu of interest.

What the villagers meant when they spoke of informal or unrecorded mortgages is not clear. However, relationships between kin are not always so benevolent, and "interest-free" loans in some cases may involve considerations such as the transfer of cultivation rights without the transfer being officially recorded. The loan would be interest free only in the sense that cash payments of interest were not made, the

interest being covered by cultivation rights. Just as in a formal mortgage with the transfer of cultivation rights, no interest accumulated. However, the borrower had an additional advantage; because the transfer of cultivation rights was not recorded in the mutation register, he ran no risk of losing his land.

Prudent farmers, which means almost all farmers, did not jeopardize more than a small part of their property when they mortgaged land. Most farmers who mortgaged land were among the largest property owners of the village. We investigated only one mortgage by a landowner with a small holding, that of the Brahman with 30 bighas mentioned above. He had mortgaged 2.3 bighas of his 30-bigha farm, only 8% of his property.¹³

We learned of only one case where a landowner mortgaged so much land that he was in serious trouble. He died before our arrival in the village. One of the largest Jat landowners, he was described as a wastrel. After his death, his son inherited the land but found the financial position of the family to be so precarious that he was in danger of losing all the land. In order to redeem the mortgage, he was compelled to sell slightly less than half of the original landholding.

The buyers were four families of Jats who then lived in Delhi. The sale took place before India attained her Independence. At that time, Delhi was a relatively small city, and the four families owned and farmed land close to the city. After Independence, Delhi began to grow at a tremendous rate and additional land for its expansion was needed for government buildings and housing. The Government expropriated the land belonging to these four families. As a result, they moved to Shanti Nagar.

The study of mortgages carried out by S. Singh (1925) in 26 villages in Ferozepore District, Punjab, about 350 km from Shanti Nagar, offers an interesting perspective on our data. The two sets of data come from different places and different times; nonetheless, they are reasonably comparable. Both sets come from Punjab as it was once demarcated, for Delhi Union Territory was until 1912 part of Punjab. Twenty-five of the 26 Ferozepore villages are Jat villages, as is Shanti Nagar, that is, Jats are the dominant agricultural caste. Although the data come from the 1950s in Delhi and from the 1920s in Ferozepore District, both sets were collected after the principal land legislation was in effect, especially the Punjab Alienation of Land Act, 1900, which came into force in 1901 (see Barrier, 1966, for a history of this act).

In Ferozepore, 99.6% of mortgages ($N = 4498$) were usufructuary, that is, the mortgagee occupied and cultivated the land. The profits from cultivation were taken in lieu of interest. Lenders were farmers with some spare money looking for an outlet. Most mortgages were verbal agreements; they were secured neither by a registered nor unregistered deed. All parties accepted as correct the transaction as recorded in the patwari records. Eighty-six percent of the transactions were between agriculturalists. Moneylenders who did not belong to a notified agricultural tribe, against whom the Alienation Act was directed, lost their business in secured credit to agriculturalists. With regard to nonagriculturalist mortgagees, the Alienation Act specified a condition of automatic redemption, that is, after a given period, usually 20 years, the mortgage was automatically redeemed. Mortgages with a conditional sale clause (*bai-bil-wafa*) whereby if the land was not redeemed by a given date it was

presumed sold to the mortgagee were forbidden by the Act. The restrictions imposed by the Alienation Act on nonagriculturalists were quite severe and effectively put an end to their making loans secured by the mortgage of agricultural land. The political goal of the Alienation Act was "to prevent the transfer of land from groups historically dominant in rural areas to village and urban based moneylenders" (Kessinger, 1974: 132).

The Alienation Act had consequences that were perhaps unforeseen. Although it effectively put the nonagriculturalist *sahukar* (moneylender) out of business and kept land in the hands of traditional cultivating castes, it may have encouraged the dispossession of individual proprietors, especially those with heavy debts. Dewey (1978: xxiv) wrote:

The act gave the peasant usurer an advantage over the non-agriculturalist moneylender, who could no longer expropriate his peasant debtor's land; and the new breed of agriculturist moneylenders created by the act was far keener than the old members of a specialist moneylending caste to grab his debtor's land for self-cultivation.

Narain and Narain (1932: 102–103) also emphasized the land-hunger of the farmer moneylender:

The *zamindar* [farmer] money-lender is no less exacting than his rival, the *mahajan* [moneylender], and copies the latter's methods in every way as regards the rate of interest and recovery of loans by speedy appropriation of grain and fodder of the borrower at harvest time. He seems to be worse than the *mahajan* in that he encourages the borrower to borrow more than he can ever hope to repay, and this forces the borrower ultimately to mortgage his land to him. Land-hunger on the part of the *zamindar* is the chief motive in his loan transactions.

On the relative merits of the *sahukar* and the agriculturalist moneylender, Darling (1978: 199) quoted a farmer, "[I]f the Land Alienation Act has rescued the sheep from the wolf, it has only been to hand him over to the butcher." The Jat moneylender, himself a farmer, knew how to squeeze the last drop out of his debtor. The *sahukar* could sometimes be intimidated, but "the Jat seizes you by the throat and knocks you down." Nonetheless, Darling regarded the agriculturist moneylender, both politically and socially, as the lesser of two evils, for it was better that land passed to someone who could cultivate it than to someone who could or would not. Overall, Darling had reservations about the Act. Dewey wrote (1978: xxiv), "Certainly Darling regarded the act as a failure, because it did nothing to provide the peasant with a superior source of credit." Better sources of credit were to appear years later as modern banking facilities became available in the villages.

In the Ferozepore District in the 1920s, 35% of the consideration money was used to redeem a previous mortgage. Three other categories of debt retirement absorbed another 29.5% of the consideration money (S. Singh, 1925: 20–21). Thus, 64.5% of the money received in the mortgage of land was used to retire previous debt. Other uses for consideration money, often thought to be major reasons for borrow-

ing, were relatively inconsequential except marriage expenses (6%) and dissolute living (13%), as described below.

Of particular interest is the category money "Due to previous mortgagee", which took 35% of the consideration money. We interpret this category in terms of the villagers' habit of redeeming and remortgaging their land if there was any advantage to be gained, either in decrease of area or increase of consideration. S. Singh (1925: 4) reported, "I have come across cases in which there have been redemptions and remortgages every year. In one case, an increase of only Rs. 3 in consideration resulted. Where the intention is to redeem and remortgage freely, it is cheaper to resort to verbal transactions and so escape the charges of registration." Patwaris liked the system of verbal mortgages because they yielded higher mutation fees (S. Singh, 1925: 4). To judge from the *Intkal* Register of Shanti Nagar, mutation fees were relatively small. In the 1950s, no fee exceeded Re 1. Most of them ranged from 5 to 10 annas.

The second most common use of consideration money, 13%, was the category "Wine, opium, gambling, dances" (S. Singh, 1925: 21). S. Singh commented that the power to mortgage land may be for productive purposes and lead to good results for farmers who are temperate and frugal. For idlers, opium users, drunkards, gamblers, and those without male issue, the same power will have adverse economic effects.

S. Singh (1925: 24–25) turned up an astonishing fact about mortgagors: the prominence among them of men without sons. The figures are striking in view of the relative rarity of sonless Jat men. Singh found that 658 sonless men engaged in 46% ($N = 4498$) of the mortgages involving 50% of the mortgaged acreage and 47% of the total consideration. His comments were scathing:

These proprietors are frequently gamblers, and waste their ancestral property. They acknowledge a larger sum as consideration than they receive; thus indicating that they have no intention to redeem the land, and, at the same time, making it difficult for reversioners to recover it. There is much gambling in the [assessment] circle. In six villages, there appear to be regular fairs in the open where men from distant places congregate and remain until they have lost everything. [S. Singh, 1925: 25]

To the limited extent that comparison is possible, the Ferozepore mortgages resemble those of Shanti Nagar. The usufructuary mortgage was predominant in both places. In both Shanti Nagar and Ferozepore, there were cases where high living forced people to mortgage land, and marriage expenses were significant. The expenses of litigation were mentioned in one case in Shanti Nagar, and they accounted for 1.5% of the consideration money in Ferozepore. Although legal expenses do not appear to be especially significant, they have the potential to become a serious problems for a family in a complicated case. We have two cases where land was redeemed and remortgaged, just as was common in Ferozepore. The motive of mortgagees in both places was to find an outlet for spare money in an economy with almost no other options. The motives of mortgagors were diverse, but they too looked for the best deal, the maximum of consideration money for the least acreage. The use of consideration money to buy equipment and houses, to improve land, and so on was rare in Ferozepore and absent in Shanti Nagar.

The great difference between the two places seems to have been the role of sonless men. In all our 11 cases of new mortgages, the mortgagors were Delhi Jats. We do not know if they were sonless, but in the case of nonresidents, this consideration is probably irrelevant. There were only a few sonless Jat and Brahman married men in Shanti Nagar in 1958. However, their condition in most cases was only temporary. For example, we noted about three sonless Brahman men who were old enough to have fathered sons. Two of them had sons in 1978. The third died without sons, but he lived his entire life as a member of a joint family in which there were sons. Moreover, a sonless man may adopt a son, and a man with a wife who bears no sons may take a second wife. For example, we counted about five sonless married Jat men old enough to have had sons. They all had sons in 1978. Two of them had taken a second wife with whom they had sons. How old must a man be before accepting the fact that he will have no sons? The first five children of one of our sonless Brahman couples in 1958 were daughters, which would be enough to discourage most couples, but then they had two sons. The subject of sonlessness, mortgage, and dissolute living cannot be treated without many instances to investigate. In any case, we can find no trace in the Shanti Nagar data of the situation that Singh found in Ferozepore. But his sample was vary large and ours was very small. No conclusions can be drawn.

Six sales were recorded in the mutation record from 1948 to 1958. In one sale, both the buyer and seller were Delhi residents. Five bighas changed hands for Rs. 800. Four of the other five sales involved the same buyers and sellers. A family of Jats living in Delhi sold land to a large joint family of village Jats. The head of the village family was an astute man, skilled in business and politics, at one time the village pradhan. He was aggressively buying land. At that time, about the only land for sale was owned by nonresidents or by people who were in financial trouble owing to unavoidable obligations or perhaps foolish expenditures.

In the case of the four sales by Delhi residents to the local family, the reason for selling was probably a family division. The sellers were three brothers. Their father may have died. After his death, what may have been a joint family divided, and the sons decided to simplify their finances. Each of the sales was a small parcel, but the four added up to 16.4 bighas, a respectable amount of land. The village Jats paid a total of Rs. 5722.50. The fifth purchase by the local Jats was a substantial parcel of 22.6 bighas that cost Rs. 10,762.50. The vendor was a Jat living in Delhi. The five purchases took place in 1954 and 1955; the total cost was Rs. 16,485, an impressive sum of money in those days.

An average value of an acre of farmland in the 1950s can be calculated from these sales. The calculated figure is best regarded as only a reasonable approximation because it is based on just five sales. In any case, the 39 bighas purchased by the Jat family of Shanti Nagar from Delhi residents in five separate sales cost Rs. 16,485, or \$426 per acre (\$1052 per ha).¹⁴ The five bighas that changed hands between the two Delhi families cost only \$162 per acre (\$399 per ha). Conversion of rupees into dollars was made at the rate in effect at the time: Rs. 4.76 = \$1.

The sums recorded in the patwari records probably exceeded those actually paid, a practice, as Lewis also noted (1958: 332–333), designed to protect the purchaser from subsequent claims under the Punjab Pre-Emption Act, 1913 by the nearest rel-

atives of the original owner who, after his sons, had first priority in the purchase of the land. Although relatives could claim this right in court, they had to repurchase the land at the price recorded in the patwari records. However, a relative could bring a suit to show that the recorded price was false. If he could prove it, by comparing the price to those recorded for comparable areas of land, he could have the price reduced. The practice of inflating the price of land was continued in the 1970s but there was another motive. People were afraid that the government might seize their land and they wanted to receive as much money for the land as possible.¹⁵

Even were one to allow for the possibility that a recorded price exceeded the actual price, the cost of land was high, far beyond the reach of all except the wealthiest farmers. However the price of land reflected its potential income rather well. An acre of land planted in sugarcane could yield a crop valued at \$160. Land capable of producing such an income would not be overvalued at \$400. On the other hand, land revenue did not begin to reflect its value. On the acre of land that sold for approximately \$400 and might yield a gross return of \$160, a farmer would pay land revenue of only \$0.62 annually. As expensive as land was in Shanti Nagar in the 1950s, the figures are modest compared with the cost of land in Vilyatpur, Punjab. During the 1950s, 56 acres of land were sold at an average price of \$691 per acre, as recorded in the patwari records (Kessinger, 1974, table 19).

People involved in the sale or mortgage of land in the 1950s were in every case members of the same caste, Jats as it happened. Our sample is small, only 11 mortgages and six sales, but the pattern is clear. Moreover, all such transactions were between landowners. We recorded no case of a landless person buying land or taking land on mortgage. Landless people in those days had little money and were themselves often in debt. The 25 mortgages redeemed were all intracaste, 16 involving Jats and 9 between Brahmans.

Kessinger writes that two pieces of legislation restricted the freedom of land transfers: The Punjab Land Alienation Act (1900) and the Punjab Pre-Emption Act (1913). "The first [act] . . . [limited] the right of purchase to members of officially designated 'agricultural tribes.'¹⁶ . . . The Pre-Emption Act, aimed at preserving the integrity of the *bhaiachara* [proprietary group of landowners descended from a common ancestor] . . . [stipulated] that members of the community had first option to purchase all land offered for sale before it could be transferred to an outsider" (Kessinger, 1974: 132, 221).

These acts, as applied to the Union Territory of Delhi, probably meant little in Shanti Nagar, for the landowning castes, the Jats and the Brahmans, were large with no shortage of people who could lend money. Moreover, a knowledgeable villager said that preemption rights had been superceded by recent land reform legislation. In any case, 198 bighas were owned by outsiders in the 1950s,¹⁷ all of them Jats, most of whom lived in Delhi. In that decade, it was custom and sentiment as much as law that was responsible for the very strong pattern of land transfers only between members of the same caste. However, intracaste transfers between residents and nonresidents of Shanti Nagar, living both in Delhi and in other villages, were more common than transfers just between residents of Shanti Nagar. In five of the six sales, Delhi residents sold to people living in Shanti Nagar. In all 11 mortgages, at least one

of the participants was a nonresident. In only 7 of the 25 mortgages redeemed were both mortgagor and mortgagee residents of Shanti Nagar.

In the 1970s, the mutation register listed no mortgages between private parties as were common in the 1950s. The six recorded mortgages were all made to a bank, the Delhi State Cooperative Bank in the three cases where we have the bank's name. A bank as mortgagee does not have *bhumidari* rights. Three of these six mortgages were made to buy farm equipment. One of them was for Rs. 35,000 and another for Rs. 31,000, the kind of money a farmer needed to buy a tractor. Both these farmers owned tractors, so it is reasonable to assume that the money had been used to buy them. The other considerations were moderate; two mortgages for Rs. 6000 and one for Rs. 12,000. Only one of these mortgages involved the purchase of agricultural equipment; the others were for ceremonial, legal, and general living expenses. One of the loans for Rs. 6000 was for a tractor, and the family indeed owned one. Another loan for Rs. 6000 was made by a man no longer a village resident but who still owned land there. This loan probably had nothing to do with agriculture. The mortgage for Rs. 12,000 was made by a widow. She leased her land rather than trying to farm it herself with hired labor. The loan no doubt was for the cost of litigation and for general expenses. We have no information about the amount or the purpose of the sixth mortgage.

The three mortgages redeemed were all *taccavi* loans. The Government made *taccavi* loans to farmers for agricultural purposes, commonly to buy cattle, Persian wheels, fodder, seed, and to pay for agricultural improvements, such as sinking a well. Farmers mortgaged land to the Government for such loans. The rate of interest, 4% per year, was much less than the rate charged by any other type of lender, including cooperative societies, which charged over 9% (Delhi Administration, 1976: 362).¹⁸

Three Jat brothers, who might have been living in a joint family when the land was mortgaged but had separated by 1958, had mortgaged 22.5 bighas for Rs. 2000. The mortgage required two separate entries in the mutation record, the first for Rs. 1500 for a masonry dugwell, and the second, for Rs. 500 for a Persian wheel. *Taccavi* loans were limited to Rs. 1500 for a well and Rs. 500 for a Persian wheel. We assume that the limitations were why two loans were required.

The third *taccavi* loan was for a tubewell. A Brahman had mortgaged 27.7 bighas for Rs. 3000. Our informant, another Brahman, said that this farmer had the first tubewell in the village. It was sunk around 1968 when the cost of a tubewell was low.

The replacement of village landowner-moneylenders by banks as mortgagees was one sign of the shift from a peasant to a modern economy. The increase in the number of sales of land was another indication of an expanding, more diverse economy. In this context, there was a change in attitude toward the ownership of land. The traditionally cautious peasant became aware that landownership might no longer be the best investment in some circumstances. It was still a very good investment, but some of the emotional commitment to landownership was wearing away. A Brahman landowner whose father had been a prominent moneylender remarked, "People used to believe that they should not sell land. There is no longer that belief. Nowadays people will sell land to have money in a fixed deposit account or for some other purpose." Formerly, land was mortgaged for "some other purpose". Now it might be sold. The old sequence of borrowing money and then mortgaging land when payments could not be met had given way to selling land to pay off loans.

Buying and selling land reflected particular family situations and so the scenarios varied from case to case. However, there were a few common themes. Farming families with insufficient land might buy a parcel to bring the size of the farm into better agreement with family needs and the availability of family labor. Immigrants to the village tended at first to live with a village family and later to buy a house site. People sold land to have money for living expenses whereas formerly they mortgaged it. They sold fields that were inconveniently located or were relatively unproductive. They sold land to pay off debts. Dissolute villagers sold land to pay for their vices. The following cases are typical.

A 37-year-old Brahman who lived separately from his father bought a plot of 1 bigha and 11 *biswas* (1.6 bighas) for Rs. 10,000 in 1973. The young Brahman was a havildar (constable) in the police and expected to be promoted soon to assistant sub-inspector. His monthly pay was Rs. 600, soon to be Rs. 700. He had taken an interest-free loan of Rs. 6000 from his sister's husband; the rest of the money came from savings. The loan was free of interest because his sister's husband also borrowed from him. He said, "It is a fantastic relationship." He had set up a building on the site in which he stored fodder and his hand-operated fodder cutter. He had already planted a garden with both vegetables and fruit trees. Eventually he planned to build a house there and would sell his current house to his older brother for perhaps Rs. 12,000. His brother could not pay him at that time, but when his brother's oldest son, 17, finished school and found a job, there would eventually be enough money to settle the debt.

In the register of mutations, the price of the land was given as Rs. 7000, but a well-informed Brahman said that the true price was Rs. 6000. The buyer was listed as the young Brahman's wife in order to circumvent the governmental policy that prohibits its employees from buying land. This stratagem of putting property in the wife's name was commonly used. Government employees can buy land, but they have to obtain permission. Our informant, himself once a government employee who had worked in the courts and was generally well informed about the law as it concerned villagers, explained, "There are questions of integrity and a side business. A side business interferes with the services of the employee. Ancestral property does not [come under this prohibition]."

This family, with a 71-year-old patriarch and six adult sons, is a fine illustration of the way that education and increased opportunities for urban employment have changed the management of land in Shanti Nagar. The family had a small landholding of only 6 bighas. The father had not yet divided it among his sons. They were putting no pressure on him to do so. Four of them had good jobs. Their share of the farm income would be relatively small compared to their salaries. In fact, they were in a position to give money to their father. The income from farming was still important but no longer vital.

The oldest son, 45, had been living separately from his father for at least 20 years. He was a matriculate failed, that is, he had failed his matriculation examination that took place after the 10th grade. In 1958, he was working in the Delhi Flour Mill and earning Rs. 60 per month. He and his family lived in the cattle shed belonging to his father. There was a fire in the mill. After the mill was rebuilt, new workers were hired. The owner offered the old workers their jobs, but demanded that they accept the beginning wage. The son chose instead to open a shop in the front of his property and

for 10 or 15 years earned his entire living from it. He married off his daughters and built a house. He said, "With a shop you can earn more than a thanadar [the officer in charge of a police station]."

Then, one after the other, three of his brothers separated from their father, and they needed land for houses. He wanted the front of the property, so he could keep his shop that faced the street. But his brothers would not agree, so he had to move the shop back into his living quarters. He lost most of his business because of the poor location off the street and the competition of other shops in the village. He again changed professions and took up agriculture. Landless himself, he rented 5 acres for a year from a landlord in a neighboring village. He paid only Rs. 2000 for all 5 acres, a low rental. He planted the land in various vegetables, especially tomatoes, and should have turned a good profit.

The next son, 40 and uneducated, was a laborer in a flour mill in Delhi in 1958 earning Rs. 60 per month. In 1977, he was an agricultural entrepreneur in the village, renting land to grow tomatoes, a lucrative crop, and also buying standing crops to harvest and market them. He rented 4 acres for a year for Rs. 1800 from one of the biggest landlords of Shanti Nagar. He grew chiefly tomatoes. His two sons and three daughters were all being educated. His future welfare depended on his two sons' finding jobs. The eldest was in his final year in higher secondary school. College was a possibility for him because his father was still in the prime of life and could continue to support the family.

Beginning with the next son, a matriculate failed and the man who bought the plot in 1973, the men of this family were educated. In 1958, he landed a job in the police, where he was still working in 1977. Land was a good investment for his savings. He was young and energetic and could take care of his garden in his spare time. However, he did not seem particularly interested in the family land. He said, "When the land is divided, I will be entitled to a share, but I will not take it." This attitude is unusual for a villager. We speculate that the family land might have been inconveniently located. His share, about 1 bigha, would have been too small to cultivate in the modern manner with a tractor and tubewell. The small plot he recently purchased was partly irrigated by canal water, partly by a handpump.

On the other hand, this constable was by no means casual about land, and, when the time comes, will probably assert his right to a share of the family farm. Pleased with his purchase of the plot of 1.6 bighas, he planned to buy additional land, probably from the same vendor. He had a tendency to hyperbole and claimed that at present he owned land worth Rs. 50,000. If he had that much land, he owned it in secret or in another village. There is no trace of any land in his name or in his wife's name in the governmental records of Shanti Nagar other than the 1.6 bighas. He mentioned no other land in our interviews with him. He spoke of earning Rs. 1000 from tomatoes, which is a reasonable figure and good money. The most lucrative strategy is to combine farming and an urban job. This young strong man probably had such an arrangement in mind.

The fourth son, 28, finished higher secondary school (11 grades) and entered the air force where he was still serving 10 years later. He and his family lived in Patiala. They visit his village family once a year in the winter, but he recently wrote that his wife had purchased a knitting machine and was learning to use it. If she developed

a business selling cardigans, they would stay in Patiala during the winter. This family's attachment to Shanti Nagar is sentimental. The family landholding makes little difference economically. He lived away from the village and was not in a position to hold a job and farm part-time.

The fifth son, 25, with a 20-year-old wife and a baby son, had not yet separated from his father. He was a villager of the modern age, one of the many Indians who planned to work in the Middle East and send money home. With an eighth-grade education, he claimed to have joined the navy only four months after his 15th birthday. He was in training for one year, studying English among other subjects. His 10 years in the navy, where he became a diver, laid the groundwork for his later life. The day after our interview, he was leaving for Mumbai (Bombay) where he would work for six months. Then he was going to Kuwait to work as a diver at a salary of Rs. 4000 per month plus overtime pay. His salary in the navy was only Rs. 700 and he complained that he had to work long hours. He expected shorter hours in Kuwait. In an earlier interview, he said that he would remit monthly Rs. 600 to Rs. 700 to his father. In this last interview, the figure had grown to Rs. 1000. In any case, he would send money home, as did so many other Indians at the time. His contract was for six years with occasional home leave. He planned eventually to bring his family to Kuwait. In the meantime, his family would stay in Shanti Nagar with his parents, although his wife would probably try to shift to the home of her own parents (*maika*). For this man, the economic resources of the family in Shanti Nagar meant little during his sojourn in Kuwait, but the home that his parents provided for his family was vital for the life of a migratory worker. His long-range plan was to serve his six years in Kuwait, save his money, and return to Shanti Nagar where he would buy land. He believed that he would be able to buy enough land to live comfortably.

The sixth son, 21 and unmarried, had passed his higher secondary examination and entered the police. He was living in Delhi but, as a young single man, had not separated from his father. He had served three-and-a-half years in the police and was a constable earning about Rs. 420. He took ghee (clarified butter) from home and sent Rs. 150 to Rs. 200 per month to his father. Men working in Delhi preferred to take their ghee from home. Commercial ghee was considered to be inferior. This young man's life will probably unfold much like that of his older brother who was also in the police.

The vendor in this case was a 45-year-old Jat woman who had been widowed in 1972, about a year before the sale. The police had found her husband unconscious in a ditch far from Shanti Nagar. The police were of the opinion that he was intoxicated when a bandit knocked him out, broke his neck, and robbed him. The widow and her brother-in-law quickly became bitter enemies. Land and an illegitimate birth were at the heart of their dispute.

The sale had been discussed before the death of her husband. He and his brother had jointly owned a parcel of land of 3 bighas, 2 *biswas*. The widow sold her husband's half-share of the plot. The Brahman buyer said that another party made a higher offer but that he had earlier spoken to the two brothers. Apparently, the widow was willing to honor her late husband's commitment. According to a man who knew the family well, the widow needed the money to pay an installment on a bank loan for a tractor. Instead, she put the money in a bank account or spent it on a marriage. We were under the impression that when a bank lent for a tractor, the bank paid the money

directly to the dealer who sold the tractor. Our informant said that sometimes the money was paid to the farmer.

Our informant said that the two brothers were selling land because they needed money for general living expenses; moreover they drank excessively, which was expensive. He also suggested that the brothers were somewhat concerned about losing land under The Delhi Land Holding (Ceiling) Act, 1960. Like all land legislation, this act is complicated, but, in brief, a ceiling of 30 standard acres was imposed on existing holdings (Delhi Administration, 1976: 611–612; India 1960?, 1972). Transfers after February 10, 1959, were deemed to be held by the transferor. Informants said that the ceiling was about 15 standard acres or 75 bighas, half the figure given in the act of 1960. One informant explained that the original ceiling had been reduced by about half in 1968.¹⁹

Family size was taken into account in setting ceilings. Five standard acres over the ceiling of 30 were allowed for each family member in excess of five, the total area not to exceed 60 standard acres (India, 1960?: 3). Other exemptions to the 30-acre ceiling concerned orchards and specialized farms, for example, a farm devoted to cattle breeding. Land ceilings were not applied where costly improvements had made a farm highly productive. The ceiling act states:

The Chief Commissioner may . . . exempt from [land ceilings] . . . a compact block of land exceeding the ceiling limit which is being used as a farm in which heavy investment or permanent structural improvements have been made and which . . . is being so efficiently managed that its break up is likely to result in a fall in production. [India, 1960?: 9–10]²⁰

This provision opens a loophole in the land ceiling act depending on how a Chief Commissioner defines heavy investment and structural improvements. In addition, there is always the question of how vigorously the Government intends to implement land ceilings. In the 1970s in Shanti Nagar, land ceilings had generated discussion and perhaps some anxiety but little or no governmental action. In any case, only three landholdings in Shanti Nagar in 1978 exceeded the 30-acre ceiling, the largest of which was about 60 acres. The family was large. With a little maneuvering, it should be able to avoid any problems with the land ceiling act.

The widow's financial problems were not solved by the sale. The register of mutations lists a mortgage of 22.4 bighas for a bank loan of Rs. 12,000 in 1976, as mentioned above. This figure would appear to be the kind of money needed for expensive farm equipment, but she owned no tractor. However, she did have five daughters, two of whom were young, one recently married and one unmarried. Moreover, she was involved in litigation with her late husband's brother and may have needed money for legal expenses. Weddings and litigation are both expensive. Her brother-in-law once owned a tractor, but had sold it. We do not know if he owned it jointly with his brother. If so, the money from the sale of the used tractor probably did not entirely cover the mortgage. The widow may have used the Rs. 7000 from the sale of land to cover her share of the cost of the tractor, but if she diverted it to other purposes, then she may have used part of the Rs. 12,000 from the later mortgage for that purpose. Our informant did not discuss this mortgage, and speculation about how the

widow used her money could be far off the mark, even when based on the statements of someone who knew the family situation quite well.

Two Brahman schoolteachers, originally from different villages in Rohtak District who moved to Shanti Nagar because they were assigned to local schools, jointly bought a plot of 1 bigha and 11 *biswas* (1.6 bighas) in 1971. Their plot adjoined the one purchased by the Brahman constable. The two sales were connected. The original plot of 3 bighas and 2 *biswas* was owned by Jat brothers. One brother sold his half-share to the schoolteachers. Two years later, the other half-share was sold to the constable by the widow of the other brother. One of the teachers lived in Shanti Nagar, the other in a neighboring village. Two informants reported that the teachers paid Rs. 5000. The price listed in the mutation register is Rs. 6000, as compared to Rs. 7000 that the constable had paid two years later for his plot of the same size. Based on six sales listed in the mutation record of plots in the habitation site, we calculate that the average price was about Rs. 4000 per bigha. Thus a price of between Rs. 6000 and Rs. 7000 for 1 bigha and 11 *biswas* would be expected.

After purchasing a plot for a house site, but before building his house, the Brahman teacher bought 12 bighas and 12 *biswas* of irrigated agricultural land in 1975. He bought the land in his own name rather than in the name of his wife, despite the fact that he was in government service. He paid Rs. 18,900 or an average of Rs. 1500 per bigha, perhaps a bit low for irrigated land. However, the land was in the low-lying *khadar* area near the railroad bridge, perhaps not the best location. The vendor was a Brahman with a large landholding, the largest of all the Brahmans. Our informant commented that the landowner had built a house and bought a tractor, so he needed money. Moreover, he considered the land to be surplus, that is, vulnerable to the land ceiling act.

The teacher, 39 years old in 1977, earned his B.A. and moved to Shanti Nagar in 1959 when he landed a job in the village school, grades one through five. While working, he continued his education and earned an M.A. in Hindi and another in Sanskrit. In 1965, he was transferred to one of the schools in Delhi and shifted his residence to the city. Three years later, he was sent back to the village school, where he taught until 1973. Then he received a promotion to a higher secondary school in a neighboring village that could easily be reached from Shanti Nagar, and so there was no need to shift his residence. When he first came to the village, he lived with a Jat family for several years, then with a Brahman family for seven years. This was the family from which he bought his farmland. Then he rented space from a carpenter and, with a seven-member family, began to think of building a house. He was apparently planning to settle permanently in Shanti Nagar.

Immigration into the village was relatively rare, most of it involving some kind of kinship relationship (S. Freed and R. Freed, 1976: 39–42). The teacher had no relatives in Shanti Nagar. He came to the village as a temporary resident solely to be near his place of employment. After several years, he became a householder, landowner, and part-time farmer. This transition was unique at the time. However, land is bought and sold much more easily than was once the case, and the scenario that the teacher represents may become more common, accompanied possibly by a lessening in the sense of village unity.

Two large Brahman families were parties to a transaction in which population increase and the breakup of joint families played a role. In 1970, a family with five sons and 160 bighas—the second largest Brahman landholding in the village—sold 13 bighas and 7 *biswas* to the wife of a 38-year-old man, head of a nuclear family living in Delhi. He had separated from what had once been a large joint family with four sons. The price was Rs. 19,000 for land probably not the best. The soil was sandy (*thali*) and the fields were located near the border of the village, an inconvenient location. However the land was irrigated, partly by the canal and the buyer had also installed a tubewell. In many respects—price, area, and location—this sale resembled the sale to the Brahman schoolteacher.

The buyer was in government service, and so the sale was recorded in his wife's name in order to avoid problems connected with the purchase of land by a government employee. He had no land in his own name, but eventually would inherit his share of his family's land. However, his family owned only 6.5 bighas of cultivable land, and it would be divided among four sons. He would need more land in order to do any significant farming. He lived in Delhi with his family and came to the village on Sundays to take care of his fields. He was a man of his day, full-time urban worker and part-time farmer.

The vendor needed money for several reasons according to our informant. He owned a tractor, an expensive item. He had ceremonial expenses. Additional houses had to be constructed to accommodate a growing family. In 1958, the family was joint with five brothers ranging in age from 24 to 7; the two oldest were already married. The other sons grew up and married. The family split into four families. The vendor and his youngest brother were in the same family; his three other brothers each headed his own family. This breakup of a single joint family into four families meant that houses were needed for each one. Moreover, the eldest and youngest brother were gradually dividing into separate families, which would probably involve additional housing expenses. Our informant also said that at one time the family had mortgaged land to the government but could not maintain the payments. Presumably money was needed to redeem the mortgage.

The buyers in 8 of the 16 land sales that we noted in the 1970s were men who did not live in Shanti Nagar. Six of them lived in a neighboring village. The other two buyers lived in Delhi. The vendors were four Jats and a Brahman, all with substantial landholdings.

The location of the land was the chief factor in these transactions. All the sales involved land far from the habitation site of Shanti Nagar and close to that of the neighboring village. Some sales were small parcels of land apparently right on the border between Shanti Nagar and the other village. Our informant said that the land was not of the best quality, and the people of the neighboring village harmed the crops growing there. Therefore the yield was low. A few of the vendors may have wanted to avoid problems with the land ceiling act, so disposing of low-yielding, inconveniently located land was an attractive step.

From the point of view of the buyers, the land was close at hand. Proximity to the habitation site meant that fields could be kept under surveillance, and little time would be lost going to them when they needed cultivation. Therefore, the new owner

could increase the yield. However, the principal consideration was that most of the land in question, certainly the small parcels along the village boundary, would be included in an expanded habitation site. Our informant said that fields could not be absorbed into the habitation site if they belonged to people from Shanti Nagar. Plot land was very valuable, not because of its yield but because of its location. The potential plots fetched a good price, and almost all landowners in Shanti Nagar with such fields were selling them to buyers in the neighboring village. In those cases where we have firm figures, the land along the village boundary was selling for Rs. 3500 per bigha. This figure was the price for plots; even the best agricultural land was less expensive.

One of the Delhi residents who bought land near the neighboring village intended to build a house and establish a poultry farm. He paid Rs. 1500 for half a bigha. The vendor was a Jat, who owned about 51 bighas, a substantial landholding. Our informant said that the poultry farm would be cover for the house. It was against the law to build a house on agricultural land, but one could build a house on land with a poultry farm. However, the poultry business was a tricky proposition, as a young intelligent Jat from Shanti Nagar learned to his sorrow. His older brother had started a poultry farm just after we left the village in 1959, and he later took over the business. The brothers built a house on the property. In his final year, the younger brother lost money and had to sell his chickens as table birds, putting him out of business (S. Freed and R. Freed, 1986: 28–30). The brothers were then illegally maintaining a house on what was now agricultural land. The Government had served notice that the house had to be razed, but the brothers managed to avoid the order until at least 1978. But seeing the inevitable, they had prudently bought a plot inside the habitation site for a house. The Delhi man's poultry farm had all the earmarks of a cover, perhaps until his 10-*biswa* plot was incorporated into the habitation site, after which a house would be legal.

Another Jat Farmer entered into three sales, two with residents of the neighboring village and one with a Delhi resident. The three parcels, none greater than 1 bigha, were clearly intended to serve as house sites. Two buyers paid at the rate of Rs. 3500 per bigha, apparently the market price for plot land. Our informant commented that the buyers intended to build houses. The vendor found it difficult to farm that land and he could sell it at a good price. Our informant described the land as "surplus", which means vulnerable to the land ceiling act. We believe that vulnerability was a consideration in this case. After the sale, the Jat owned 13.5 kilas, just under what villagers claimed to be the land ceiling.

One family that sold land to residents of a neighboring village had once been in serious financial trouble but appeared to have recovered by 1977. Thus the sale was not because of any current money problem. The reason was probably the usual one: the disposal of inconvenient land at a good price. Seven bighas and 11 *biswas* were sold for Rs. 15,000, or about Rs. 2000 per bigha. Our informant said that the buyers wanted the land for house sites. The purchasers were four brothers. If a large joint family was in the process of breaking up, additional house sites would be necessary.

The same Brahman man who sold 12.8 bighas to the immigrant schoolteacher in 1975 had also sold 9.25 bighas to residents of the neighboring village in 1974. Like the land sold to the teacher, the land of the 1974 sale was inconveniently located in the *khadar* area near the railroad. The vendor needed money. However, in this case,

our informant emphasized fear of the land ceiling act. He said that rumors about the act were frightening people and they had begun to sell land. The vendor was credited with 240 bighas in the 1950s, which was reduced to 210 bighas after land consolidation. He had two sons. He divided his land into three parts. He kept 75 bighas in his own name and transferred 68 bighas to each of his sons. He died in 1977, and his 75 bighas would be divided between his sons. The land ceiling was said to be about 15 standard acres or 72 bighas. Thus, after land consolidation and the sales, his sons were close to the ceiling and he was just above it. After his death, his sons would be far over the limit. The sons would have to handle their land adeptly to avoid losing a significant amount to the Government. We think that they will manage very well. In such situations, Indian farmers are tenacious.

The last land sale to people of the neighboring village that we copied from the mutation record was by a Jat with 18 kilas, substantially over what was the ceiling, as the villagers understood it. He sold 4.8 bighas for Rs. 12,300. The motives for the sale were mixed, which is true of almost all sales, but in this case, fear of the land ceiling act probably entered into his decision. Also, the man probably needed money. Although not a really heavy drinker and perfectly capable of managing his property, he did drink a good deal, which was costly and always an invitation to trouble. His father also had a reputation as a drinker, but nonetheless was an extremely capable man and highly respected. However, the son was far from his father's caliber, and drinking killed him. He went to what seems to have been a roadhouse in another village, drank too much, fell into a ditch, and broke his neck. As noted above, the police believed that a dacoit had robbed him. His death unleashed a host of family problems, and his widow began to mortgage and sell land, presumably to meet expenses but perhaps also with an eye to the land ceiling act. If the act applied to personal cultivation rather than to ownership, she had no worries, for she had leased 5 to 7 acres to a Jhinvar Waterman.

MODES OF CULTIVATION, LAND, AND LABOR: 1950s

Sale, mortgage, tenancy (rental), and sharing cultivation are all ways to change the adjustment of land, capital, and labor. From the point of view of rapid adjustment to changing conditions, sale and mortgage are cumbersome. They are legally complex, require careful negotiation, and have long-term consequences. Sales are effectively permanent, but even mortgages can last for several years or decades. Important money changes hands, and the transactions are recorded in governmental records.

Tenancy and the sharing of cultivation are the chief methods by which villagers achieved efficient exploitation of their agricultural land in the 1950s. Early in the 20th century and for decades thereafter, tenancy was prominent. One of the patwari records for Shanti Nagar, the *Mufasil Jamabandi* (1907–1908) shows that approximately 32% of the village fields (*khasras*) were farmed by tenants, the great majority of whom paid their rental (*lagan*) in cash, the rest paying in unspecified services, grain, or by paying one-half or one-third of the yield to the owner, the latter arrangement known as *batai* (sharecropping).²¹ Cash rentals varied widely but in general were low, a rupee or two per bigha. The figure of Rs. 1.25 per bigha was mentioned several times.

This percentage of tenants agrees quite well with approximately contemporaneous figures from two villages in Rohtak District, Punjab. In 1904–1905, tenants in

one village farmed 31% of the land; in the other village, the figure was 36% (Narain and Narain, 1932: 80).²² Narain and Narain cited three chief reasons for the importance of the tenancy system: the consolidation of cultivation, the reduction of land fragmentation, and the desire to spend one's labor on the best available fields. They wrote:

Efforts at consolidation of cultivation. There is a marked tendency among owners to take on rent fields adjacent to their own and let on rent their inconveniently situated fields with a view to *consolidate their cultivation* on one big plot—(to be distinguished from the consolidation of holdings).

Fragmentation of holdings. An owner whose holdings are scattered over the whole village in ten or twelve plots situated at wide distances from one another, is often obliged to let some of them on rent owing to his inability to cultivate all of them himself.

Efforts at securing irrigated land on the part of owners who have mostly barani lands. The high prices which irrigated crops fetch, and the desire for a higher standard of living make cultivators work harder than before. Thus some cultivate as non-occupancy tenants under six or eight owners and obtain sometimes very small plots situated at considerable distances from each other. [Narain and Narain, 1932: 80]

Narain and Narain's third point, the desire to make more money, was probably the main reason for tenant farming in Shanti Nagar in the 1950s. Although almost all tenants were also landowners, some of them had small holdings and could easily cultivate some additional land. As for the first two points, a landlord with fields of poor quality or which were inconveniently located might let them lie fallow or do the minimum work on them. He worked hard on his good irrigated fields; any yield from the poor fields was welcome but not particularly important. In the 1970s, land consolidation took care of Narain and Narain's first two points. If, after consolidation, a farmer still had an inconveniently located field, he would probably sell it rather than deal with a tenant. In that decade, the overriding consideration in the rental of land from both the landlord's and tenant's point of view was income.

The next relevant patwari record for Shanti Nagar that we have after the *Mufasil Jamabandi* (1907–1908) is the *Khasra Girdawari* (1957–1958). The situation concerning tenants had changed. Only about 10% of the fields in the late 1950s were listed as being cultivated by tenants, as compared to 32% 50 years earlier. The payment of rent in cash had almost entirely disappeared; only two tenants were listed as paying their rent in cash. Another two tenants paid the land revenue (the land tax) as rent. The rest of the tenants shared the yield at harvest equally with the landlord. By the 1950s, landowners were careful about permitting tenants to farm their land for fear of losing it under the terms of land reform legislation. Some individuals ran no risk of losing their land if they permitted tenants to cultivate it; among them were military personnel absent from the village, widows, and minors.

Rental agreements between landlord and tenant as entered in the patwari records mentioned only the cash rent or else the way the crop was to be divided. Such agreements were more complicated than that because the two parties had also to take into

account the costs of cultivation. A few specific cases will show some of the ways that villagers partitioned the costs of cultivation.

A Jat army officer leased 30 bighas to a Brahman. He and his tenant shared the produce equally. The cost of seed was equally divided. The tenant used his own plow and bullocks, furnished the manure, and also paid the hired laborers. In the 1970s when *batai* was rare and cash rentals were again the common form of tenancy, the rental payment included usually plowing and irrigation. This was because landlords often owned tractors but tenants did not. Also, the landlord would irrigate the field from his tubewell. However, if the tenant had a tractor and the landlord had none, then the tenant would use his equipment. Also, the tenant might pay for the water if it was obtained from a private tubewell rather than from the Government. The cost of factory fertilizer would often be shared equally. All tenancy agreements depended on circumstances, and details varied.

An arrangement in the 1950s similar to that of the Jat officer and the Brahman was between a Jat widow with a minor son and a Bairagi. It involved 76 bighas. They shared the produce and the cost of the seed. The tenant used his own bullocks. This Bairagi tenant also farmed some land for a Jat. We did not note the amount of land, but the produce was equally divided. In general, the owner paid the land revenue and irrigation charges to avoid any presumption that he was not the cultivator. If, according to prior agreement, these fees were to be shared, the tenant paid his share to the landowner, not to the Government.

The agreements in the 1950s between two families of Jhinvar Watercarriers and several Jat landowners were somewhat different from the foregoing examples. Each Jhinvar family rented a garden of fruit trees for a yearly rental, Rs. 110 for a garden of 2 bighas and Rs. 150 for one of 3 bighas plus 3 maunds (1 maund = 40 seers or 37.2 kg) of guavas. The Jhinvars retained the rest of the produce. The two families also rented about 4 bighas for an annual fee of Rs. 40 per bigha, and sharecropped an additional 4 bighas. They grew tomatoes on the rented land and sugarcane on the land that they farmed on shares. In the case of tomatoes, they either paid cash rent or half of the produce. For sugarcane, they retained two-thirds of the produce. Sugarcane is labor intensive and, moreover, the Jhinvars provided the seed and bullocks.

The Jhinvars said that in the past they had been able to rent 60 or 70 bighas but for the last three or four years had not been able to rent any, or at least relatively little. Landlords were very careful. These rental agreements were informal; nothing went on paper. We checked our informant's statement against the patwari records. There was no mention of any tenancy agreement involving the Jhinvars.

We can only speculate as to why there was a shift from paying rent in cash in 1907–1908 to *batai* in the mid-1950s, usually equal shares, but for some crops and in some circumstances, two-thirds versus one-third of the produce. The cash rent given in the patwari record was Rs. 40 per bigha. This sum is about half of the value of wheat grown on a bigha of irrigated land. The average yield in the mid-1950s was 3.5 maunds of grain and 6.3 maunds of chaff. Wheat sold for Rs. 16 per maund, and chaff for Rs. 3, for a gross return of Rs. 75. Two reasons come to mind for the change from cash to kind. First, if a tenant could not sell his wheat in the village, he would have to take it to the market in a nearby town to obtain cash. He would have to pay

a cartage cost of 6 annas per maund and also a broker's commission. Moreover, when villagers sold wheat in the market, a maund was weighed at a bit more than 40 seers (Freed and Freed, 1978: 64, 68).

Another reason could be that paying in kind reduced the risk of loss for the tenant, or at least made a final accounting simpler. Usually a tenant would have to pay the full cash rental even if the crop fell below expectations. Payment in kind meant that the tenant would not be squeezed by a below average yield. In fact, tenants could in some cases renegotiate a cash rental in a bad year or a landowner might agree to extend a lease or contract for a few months without further payment. For example, a lease for the tomato season good only until late March might be extended a few months so that the tenant could grow summer vegetables and melons. Such adjustments were sometimes invoked in the 1970s. If a crop went bad, a landlord did not always expect to receive the full agreed rent. However, such compromises were rare according to tenants. On the other hand, landlords complained of not receiving their payments. In any case, a cash rental, which was equivalent to half the usual return from a field, protected the landlord from loss. The tenant bore all the risk but would also benefit from higher profits in an unusually good agricultural year. *Batai* divides equally both the risk and above-average profits.

Narain and Narain evaluate cash rental versus *batai* from a different point of view. Our evaluation emphasizes the position of the tenant rather than that of the landlord, taking into account the tenant's costs and his desire to avoid being racked between a cash rent and a poor harvest. Narain and Narain looked at the problem from the standpoint of the landowner and the difference between irrigated and *barani* fields, that is, fields that depend on rainfall for their cultivation. Narain and Narain wrote:

[T]he only form of rent before 1895–96, the year of the opening of the [irrigation canal], was cash rents. Since that date we find a gradual falling off of area under cash rents in the irrigated villages and a rise in the proportion of area under *batai*. Whereas in Bhensru Kalan (unirrigated) cash rents continue to be the predominant form of rent, in Gijhi cash rents completely disappeared in 1916–17. The reason for this is that the yield is assured in irrigated areas and the high price of produce makes *batai* the preferred form of rent from the standpoint of the owners. The case of *barani* tracts is different. If rains fail nothing may be produced and consequently no *batai* obtained by the owner; hence the preponderance in *barani* tracts of cash rents, which have to be paid irrespective of the yield. [Narain and Narain, 1932: 181–182]

Narain and Narain's analysis calls for a few qualifications. Even in irrigated fields, yields can be disappointing. Insect damage, hail, marauding herds of feral cattle, soil damage due to waterlogging, and theft of crops are all possibilities. Second, fixed rents can be renegotiated, especially when the relations of landowner and tenant are longstanding and friendly. Finally, cash rents can replace *batai* in irrigated villages, as happened in Shanti Nagar between the 1950s and the 1970s (table 4). Economic changes such as the shift from cash to *batai* or the reverse probably depend on many factors,

TABLE 4.
FAMILIES RENTING IN LAND (IN BIGHAS) AND THEIR LANDLORDS, 1977-1978

CASE NUMBER	FAMILIES					LANDLORDS ^b				
	CASTE	ADULT ^a MEMBERS	TOTAL MEMBERS	LAND RENTED	RS. PER BIGHA	LAND OWNED	CASTE	LAND OWNED	ADULT MEMBERS	TOTAL MEMBERS
1	Bairagi	6	12	7.0	share	6.4	Jat	65	7	11
2	Brahman	6	12	4.0	300	1.5	Brahman	38	3	5
3	Brahman	2	5	2.0	share	12.5	Brahman	28	5	9
4	Brahman	2	5	24.0	417	1.1				
5	Brahman	2	7	4.0	450	1.1	Jat	205	5	6
6	Brahman	4	5	5.0	250	0.8				
7	Brahman	3	4	4.8	292	6.0	Brahman	4.8	3	7
8	Chamar	2	6	4.2	share	0				
9	Chamar	4	8	unknown	417	0				
10	Chamar	2	7	9.6	417	0	Jat	60	4	12
11	Chamar	4	9	6.0	333	0	Jat	60	4	12
12	Chamar	11	18	4.8	354	0	Brahman	60	5	11
13	Chamar	12	21	17.0	354	0	Jat	60	2	6
14	Chamar	5	10	11.05	480	0	2 Jats	60 each	4 & 2	12 & 6
15	Chamar	3	9	9.6	417	0	Jat	132	6	13
16	Chamar	5	9	9.6	417	0	Jat	205	5	6
17	Jhinvar	3	8	9.6	343	0	Brahman	75	2	2
18	Jhinvar	3	6	17.0	264	0	Jat	86	3	3
19	Potter	6	9	4.0	share	0	Brahman	68	4	8
20	Potter	4	7	7.2	285	0	Jat			

CASE NUMBER	FAMILIES					LANDLORDS ^b				
	CASTE	ADULT ^a MEMBERS	TOTAL MEMBERS	LAND RENTED	RS. PER BIGHA	LAND OWNED	CASTE	LAND OWNED	ADULT MEMBERS	TOTAL MEMBERS
21	Potter	9	17	9.6	417	0	2 Jats	285, 132	8 & 6	14 & 13
22	Potter	6	7	4.8	417	0	Jat	132	6	13
23	Potter	5	5	14.4	375	0	Jat	101	2	7
24	Potter	2	8	12.0	438	0				
25	Potter	2	8	9.6	417	0	Jat	45	5	11
26	Potter	3	10	9.6	417	0	Brahman	75	2	2
27	Mali	4	7	4.8	354	6.7	Brahman	68	4	8
	Total land rented = 225.3, average per family = 8.7						Average landholding, landlords who rent = 87			
	Average members per renter family = 8.9						Average landholding, all landlords = 40			
	Average adults per renter family = 4.4						Average family members,			
	Average members, all village families = 7.5						landlords who rent = 7.9			
	Average adults, all village families = 3.9						Average family members, all landlords = 7.7			
							Average adult family members,			
							landlords who rent = 4.2			
							Average adult family members,			
							all landlords = 4.1			

^aAdult for men: 20 years of age and older and those in their late teens who are married and have finished school; for women: 16 years and older.

^bSome landlords rented to more than one renter. There were 15 different landlords, not counting the outsiders and the unknowns. We have no information for the landlords of cases 6 and 8. The landlords of cases 4, 9, 20, and 24 were not residents of Shanti Nagar. We have no further information about these outsiders.

^aAdult for men: 20 years of age and older and those in their late teens who are married and have finished school; for women: 16 years and older.

^bSome landlords rented to more than one renter. There were 15 different landlords, not counting the outsiders and the unknowns. We have no information for the landlords of cases 6 and 8. The landlords of cases 4, 9, 20, and 24 were not residents of Shanti Nagar. We have no further information about these outsiders.

some unsuspected, among which the relations are complex. Conclusions based on only two variables and a few cases are unlikely to prove generally valid.

There are two types of tenants: those who have permanent right of occupancy (*maurusi* tenants), and tenants-at-will (*ghair maurusi* tenants). In the 1950s, occupancy tenancy, with 27 listed cases (field numbers), was less common than tenancy-at-will, 42 cases. We can identify the individuals involved in most cases of permanent tenancy and, with one exception, it is always a Jat landlord and a Brahman tenant. Permanent occupancy tenants do not have to farm their land; they can act much as landowners do and have tenants of their own. For example, a single Brahman had the right of permanent tenancy in 13 fields. Nine of his fields were cultivated by subtenants, and he had a partner in the cultivation of three other fields. The actual cultivators shared the yield equally. The records do not indicate his payment to the landlord. Lewis (1958: 103) deals with this point. In Rampur, Delhi Union Territory, there were three arrangements. A permanent tenant paid the landlord only the land revenue due on the property; second, he paid the land revenue plus a fee of 2 annas for every rupee of revenue;²³ or third, he paid nothing at all. The permanent occupancy tenants in Rampur were Brahmans, as was generally true in Shanti Nagar as well. The Brahmans enjoying the right of permanent tenancy could be the family priests of their Jat landlords, but we have no data from Shanti Nagar on this point.

The *Khasra Girdawari* of 1957–1958 for Shanti Nagar indicates that none of the 27 permanent occupancy tenants paid rent to his landlord. If this was indeed the case, it would seem that permanent occupancy tenants were a losing proposition for a landlord, who would still be responsible for the land revenue. By the 1950s, land revenue was a risible sum, but it was nonetheless an expense (S. Freed and R. Freed, 1978: 24–25). How and why then was the system of permanent tenancy established?

Aggarawala traces the system in Punjab back to the mid-19th century when the British annexed the province. One of their first tasks was to make a land settlement that would have two components: the assessment of land revenue, and the drawing up of a record of the rights and interests of all people connected with the land whose produce generated the revenue. Earlier land settlements in what is now Uttar Pradesh contained a provision under which nonproprietary cultivators were to be recorded as having rights of occupancy. This provision was carried over to Punjab.

No opposition on the part of the proprietors themselves was made to this proceeding; on the contrary, they everywhere showed a readiness, amounting almost to eagerness to induce men of this class to share with them on almost any terms the new and then much dreaded responsibility of the system of fixed cash-assessment; and the terms generally recorded were that for the period of settlement these tenants should hold their lands on payment of the quotas of revenue assessed thereon, with the addition sometimes of a small proprietary fee, or *malikana*, varying from five to ten per cent on revenue. [Aggarawala, 1956: xiii]

Narain and Narain's data concerning occupancy tenancy in three Punjab villages seem at odds with Aggarawala's suggestion of a blossoming of such tenancy in Punjab. In two of the villages, no land was under occupancy tenancy, and in the third,

only 4.7% of the village area was credited to occupancy tenants. On the other hand, about one-third of the land in two villages was cultivated by tenants-at-will (Narain and Narain, 1932: 180–181).

To avoid losing land to tenants, landlords in the 1950s used a tactic that probably had its roots in the Punjab Tenancy Act of 1868. The tenant would make a statement to the appropriate authorities waiving his tenancy rights (Aggarawala, 1956: xiv). The intent of the Delhi Land Reforms Act of 1954 was to establish a uniform body of peasant proprietors with no intermediaries. The act provided that tenants who had cultivated land since 1952 or before were to become its owners. In Shanti Nagar, the most common result of this legislation was that tenants voluntarily, or under varying degrees of pressure, furnished statements that they had not cultivated the land in question during the critical period (S. Freed and R. Freed, 1976: 172–173).

Tenants-at-will in the 1950s were a more varied group, castewise, than permanent tenants. Four castes were represented: Brahmans, Bairagis, Jats, and Leatherworkers. Whereas the permanent tenants were almost always Brahmans, only 6 of the 42 cases (field numbers) of nonoccupancy tenancy involved Brahman tenants. In 9 cases, the tenants were Bairagis. Three tenants were Leatherworkers. The Jats were counted as tenants in 3 cases; 2 other Jat cases were ambiguous, but were more likely mortgages than tenancy. The caste of the rest of the tenants, many of whom could not be identified and who were probably nonresidents, could not be determined.

All but two of the tenants were also landowners, including one of the three Leatherworker (Chamar) tenants. This man, the only Leatherworker landowner, cultivated eight fields, paying one half the yield as rent. Four of his fields were rented presumably from nonresidents, for we could find their names neither in our own census nor in the genealogical tables of the patwari records. This Chamar was a clever and aggressive man. He may have contacted nonresident owners and offered to rent fields from them. He had acquired the land that he owned in a lawsuit based on occupancy right. Perhaps he had a similar scenario in mind concerning the land that he was cultivating for nonresident landlords. The Chamar might have thought that a nonresident landlord would have less stomach for a court case than a resident landowner. There is some evidence for this point of view. Although the “one-half yield” accompanying the Chamar’s name in the records was not identified as *batai* or rent, we can think of no other explanation. The other two Leatherworkers paid a rent of Rs. 40 per year, which was specifically labeled as rent.

The arrangement between one of these Leatherworker renters and his landlord is of interest because it illustrates the ambiguities and problems with which someone who is not an expert must deal in using patwari records. The Chamar is listed as “mortgagee” who paid an annual rent (*lagan*) of Rs. 40 to the landlord. The mortgage is not listed in the mutation record, from which we have the entries from 1948 to 1958. The mortgage would not have been made before 1948 as the Chamar would then have been less than 17 years old. However, one can think of possible explanations for the absence of an entry in the mutation record; the mortgage may have been recent and the patwari may have been late in posting the entry. The question in any case is one of classification: mortgage or rental. “*Lagan*” is usually translated as “land rent”. There was no mention of *malikana* (proprietary fee), which would have

proven a rental arrangement. We classified the case as one of rental despite the mention of a mortgage.

Although somewhat arbitrary, the decision in the above case was relatively clear-cut. Many other cases are more difficult. There are several sources of ambiguity. Individuals sometimes cannot be identified, for some names are popular and denote more than one person. Men born in their mother's brother's village are always named Mam Chand. Some individuals are denoted by more than one name, for example Bharat Singh and the familiar form of the name, Bhirtu. Other people listed in the patwari records are deceased and may be hard to identify in genealogical records. Nonresidents are not always identified as such, though this status may be suspected due to an unfamiliar name. References to payments and areas of land are sometimes too cryptic to be clear. The best procedure for an inexperienced investigator would be to work through the patwari records case by case with the village patwari, who might not have the time, or with a retired patwari. However, time spent with documents reduces the time available for observation and interviewing. Moreover, beyond the problems of the patwari records themselves, there is always the question of how closely the records agree with the actual situation. All researchers using patwari records note this discrepancy. For example, Lewis (1958: 104) comments, "A comparison of data on rentals as given in the village *patwari* records with our data based on interviews of landowners and tenants reveals a considerable discrepancy and suggests that the *patwari* records are unreliable on this particular score." Nonetheless, conclusions supported by a substantial majority of the data may be accepted despite the awareness that quantitative data that appear to be firm may in fact be rather soft.

There is a story behind every entry, and the temptation is sometimes strong to spin a tale based on an analogy with a known case. For example, a long-deceased man, most likely a Bairagi, is listed as the permanent cultivator of some common land (*shamilat*). He probably moved onto vacant land of poor quality and began to farm it. After many years, he claimed the right of permanent occupancy. A Brahman landlord described a similar case that concerned his deceased grandfather:

I own 11 bighas of land in [a neighboring village] as does the other branch of the family [his cousins]. My grandfather occupied some waste land belonging to that village and managed to bring it into production. The people of the other village did not like it and appeared one day to evict him. He felt that he had spent more money to reclaim the land than the land had originally been worth and so he had a strong moral claim to the land. He took an ax and made his wife sit in the field. He told the other villagers that he would first kill his wife and then fight them until he himself was killed. His threat was effective and the other villagers left him. His name was entered in the [patwari records].

In effect, squatters' rights are sometimes recognized, especially as regards common land. A particular individual has only a partial stake in common land and may not be willing to defend it as strongly as his own land, where his stake is 100%.

Tenants who rented by paying cash or grain in 1907–1908, about 32% of the entries in the patwari records, declined to 10% in the *Khasra Girdawari* (1957–1958).

They appear to have been replaced by landowning farmers, listed as partners, who shared cultivation. The category of partners amounted to about 27% of the entries. The rest of the entries, about 62%, listed the owner as the cultivator. Among the reasons for this change of cultivators from tenants to partners was almost surely the potential consequences for the individual landowner from the Delhi Land Reforms Act, 1954.

The entries in which cultivation is shared break down into one group where one of the cultivators is also the owner, and a second group where the owner is not one of the cultivators. In cases where the owner shares cultivation with someone else, the other party is often a relative, usually a brother. The entries in the *Khasra Gir-dawari* proceed field by field, and so the names of a few pairs of brothers may appear many times. For example, one pair of brothers accounted for about 30% of the entries where cultivation was shared. A typical entry for a particular field can be paraphrased as follows: cultivated by the owner (as partner) 4 bighas; cultivated by his brother (partner) 7.2 bighas. We do not know the reasons for such arrangements. We could have questioned people while we were living in Shanti Nagar, but we did not notice these entries before we left the village, and then it was too late. "Partner" arrangements were overwhelmingly between Jats. Lewis (1958: 104) noted similar cases in Rampur and suggested that they involved arrangements where one brother cultivated the land while the other worked at an outside job. This explanation does not fit the cases in Shanti Nagar.

MODES OF CULTIVATION, LAND, AND LABOR: 1970s

Tenancy in the 1970s had a different character than in the 1950s. The difference was related to the evolution of agriculture from peasant farming in the 1950s to modern mechanized agriculture during the Green Revolution and to a concomitant rapidly developing economy. It was most noticeable in the attitude of tenants. They were entrepreneurs, businessmen, far removed from the farming of earlier times where subsistence rather than profit was the key. Most of them were lower caste people, but they dealt with high-caste landlords essentially on the basis of equality. Their caste status was not particularly important. It was two businessmen making a deal. A Leatherworker man commented, "You have to think in a business way. You cannot be afraid to lose money. You have to take risks to make money."

Money from vegetable farming had made renting land a big business for both landlord and tenant. Land was rented either for a season or for a year. Land was usually rented by the acre at Rs. 2000 (Rs. 417 per bigha). Payment was by installments, usually two, the first when an agreement was made and the second, at the end of the season. A season was defined in terms of a specific crop, often tomatoes. Tenants occupied a field for about six months. The season ended at Holi, a festival that took place in late March, at which time the tenant vacated the field. Rents varied considerably (table 4) and seemed to have little connection to the length of the lease, probably because differences in land quality would be more important than the length of a lease and would effectively mask its effect. We treat all rents, whether for one year or six months, as representing a single set of data.

Cash rent in the late 1950s was Rs. 40 per bigha; in the 1970s, it usually was Rs. 417 per bigha, just over 10 times as much. As a measure of inflation, we use the price of wheat, the staple crop. It was Rs. 16 per maund in the 1950s and Rs. 50 in the 1970s, a little over three times as much. The rupee itself had held reasonably firm against the dollar, losing less than half its value over the two decades. In any case, the increased return from renting land surpassed by far the price increase due to inflation.

A change in tenancy from the 1950s to the 1970s concerned the demographics of the renters. Only 2 of the 9 tenants in the 1950s owned no land, whereas 20 of the 27 tenants of the 1970s were landless, most of them low caste. There were more tenants in the 1970s than in the 1950s, but they rented smaller areas, generally an acre or two. The largest rental was 24 bighas; in the 1950s, one tenant cultivated 76 bighas on shares, and another had 30 bighas.

The relatively small fields that were rented in the 1970s reflect the work that was required to grow tomatoes, the crop almost always grown by renters. Tomatoes are labor intensive. They were started in nurseries and transplanted. A field had to be plowed several times, rolled, and furrowed. Tomatoes were harvested every two or three days for several months, packed in baskets, and transported to the Delhi Vegetable Market where the cultivator sold them through a commission agent. Most families could handle only an acre or two of tomatoes.

Because of labor requirements, we thought that perhaps families who worked rented land would be larger than average and have more adult members. This proved to be the case. Families who took land on rent had about one-and-a-half more members than the average (table 4). Renting families also had more adult members than the average, but the difference was small, about one-half an adult. However, children can help with the tomato crop, so in general and based on a very small number of cases, families who rented in land were indeed larger than the average village family.

It seemed likely that the opposite situation might characterize the landlords, that is, landowning families that rented out land would be slightly smaller than the average landowning family, and that the average of adult family workers would show a similar feature. This supposition was not verified. The number of persons in the two kinds of families was almost the same, and the number of adults was effectively equal (table 4). However, there was one pronounced difference between the two kinds of families: the size of landholding. The average for all landowners was 40 bighas; for landlords who rented out, the average landholding was 87 bighas.

Specific cases not only give a human touch to figures but also provide insights that are not apparent in statistics. The case of the Bairagi who farmed the land of a Jat widow in the 1950s illustrates how specific crops affect tenancy arrangements and how tractors, a prominent feature of the Green Revolution, have lightened agricultural labor in the 1970s, thus opening cultivation to people who otherwise might find it difficult. The eight-member tenant family in the 1950s had two adults and two teenaged sons who could help with farming. One was in school, but the other had left school and helped his father full time. The family had 3.5 bighas of irrigated land. The family was dependent on agriculture, and their small landholding would have been inadequate for their needs. However, the middle-aged family head, who owned

two bullocks, was a vigorous man with three other family members available to assist him. He was a fine tenant for a widow who could not herself exploit her land.

In the 1970s, his family had grown to 12 members. Two of his sons were grown, married although still living with their parents, and provided side income. One had an office job in Delhi; the other had opened a shop in the village. After land consolidation, he had 9.6 bighas. He grew wheat on his own land. He no longer farmed the widow's land—76 bighas in the 1950s, most of it in wheat during the rabi season—but instead rented 7 bighas of land from another Jat where the family grew tomatoes. The Bairagis and the Jat shared the cost of seed and irrigation equally. The Bairagis paid all the other expenses of cultivation, such as weeding, harvesting, and plowing and also provided the baskets for packing the tomatoes. They hired a man with a tractor to plow. They took the tomatoes to market and sold them. They had one bullock and a cart, which they may occasionally have used to haul their tomatoes to market. The selling expenses, such as bus fare, transport, commissions, and the labor hired for unloading, were deducted from the sale of the tomatoes. The remaining money was divided equally. From wheat to tomatoes, from bullocks to tractor.

In the 1950s, the widow's family had only three members. Although she was the senior family member and therefore the family head, she was over 70 and too old to take a vigorous role in managing family affairs. Her daughter-in-law, also a widow, was basically in charge. The third family member, a schoolboy, was 15 years old. There was also a married daughter, 16, who lived with her husband in another village but at her youthful age made long visits to her natal family.

The family had 76 canal-irrigated bighas, too large a farm to manage without an adult man. They retained some fields for their personal use and rented the rest to the Bairagi. Tenant and landlord divided the crops equally except sugarcane for which the Bairagis received two shares and the Jats, one. The reason for the two-to-one split was that sugarcane is labor intensive. The Bairagis did all the work.

Landlord and tenant farmed independently. That they shared the cultivation of a single farm did not lead to a cooperative effort in the fields. One day in late May, we saw the younger widow and her daughter, who was home on a visit, weeding sugarcane. The Bairagi tenant, his wife and two sons were working in the neighboring field. The widow called to the Bairagis asking them to share labor (*dangwara*). They would work in her field today and she would work in their field the next day. The Bairagis declined, declaring that they did not exchange labor.

Twenty years later, these Jats had less land, presumably the result of land consolidation when they traded land of lesser quality for better land. The 15-year-old schoolboy had married and then died leaving his widow, two sons, and three daughters. There were then 10 household members, 3 of whom were sons of the dead man's sister, the girl mentioned above who was helping her mother in the fields 20 years earlier. The widow had called these children to her house even before her husband's untimely death early in 1977 because she liked children. They also supplied some necessary male farm labor, because her own sons were only 12 and 10 years old. After her husband's death, their participation in farm work was almost essential. One of the nephews was 18, had finished school, and took care of the farming. Another nephew, 20, had a city job but was available for occasional farm work. The third

nephew, 16, was in school but also helped with the farming. The family could now handle their land efficiently. They hired a man with a tractor to do the plowing, the hardest work, and did most of the rest of the work themselves. The widow gave two cows to her husband's sister, partly, we believe, in gratitude for the "loan" of the three young men. This situation, where men shift residence to fill an empty role, resembles those cases where a wife dies and a family is left without an adult woman to take care of the cooking and other tasks of women. In such a case, a married daughter or sister would return to her father's house to fill the vacant role.

Most tenants were village residents, but there were also four families of migrants who rented gardens. They lived in temporary thatched huts during the crop season and then returned to their own villages. One man, Jhinvar by caste and gardener by profession, had been in the village a few months when we interviewed him in early January 1978. He had been coming to this area for a long time, previously setting up in a neighboring village. He lived with his nine-year-old daughter in a thatched hut. She helped to guard the garden and, we assume, did the cooking or at least helped with it. Before coming to Shanti Nagar, he had taken a garden in Jhajjar, Haryana, but had to leave because of flooding.

He rented a Brahman's garden for two years for Rs. 1500. The payment covered only jujube (*ber*)—a plumlike fruit—which were harvested during the cold season. The garden had not been cared for properly, but he claimed not to have known that when he took it. It should have been irrigated and the soil loosened around the roots of the trees. Otherwise, the flowers burned in hot weather. Moreover, the owner did not do enough grafting. The gardener planned to cut off the small trees close to the ground and graft on shoots from good trees. Grafting can also be done on big trees. In fact, the thicker the trunk, the better it is for grafting. This work is done in April–May after the *ber* harvest. Hot weather is needed for the graft to take.

Because of the poor condition of the garden, he expected to harvest only about 15 or 16 maunds of jujube during the current year. A good year would yield 50 or 60 maunds. Even if he lost money the first year, he would cover the loss in the second year and also make a good profit. However, he seemed too pessimistic about the current year. Jujube sold for Rs. 3 or Rs. 4 per kilogram in the Delhi vegetable market. A maund is equivalent to 37.2 kg. Thus he might earn Rs. 2000 even with the expected weak harvest, a figure well above the rental of Rs. 750 for the season. The return from a good year could be more than three times as much as a bad year, which would make the contract a very good deal.

The jujube ripened early in February and were picked until Holi, that is, toward the end of March. After Holi, a worm destroys the fruit. He went to market every day during the harvest. After Holi, he went back to his village but would return to Shanti Nagar for the mango season in June and July. The mango crop would require another contract. He was an industrious man, making baskets as well as raising fruit. Basketry is a traditional craft of the Jhinvars, and his baskets were just like those made by the Jhinvars of Shanti Nagar. People in north Indian villages work hard and rarely neglect an opportunity to turn a rupee.

In all cases but one, rented farmland was used for agriculture. The one exception concerned a Jat, a rich important man in the 1950s, who later was ruined by alco-

hol. We knew him well. Under the pseudonym of Tippler, he figured prominently in several of our monographs (R. Freed and S. Freed, 1993; S. Freed and R. Freed, 1987, 1998). Tippler was the "factional leader" who gave us what was probably our best single interview on political strategy and motives (S. Freed and R. Freed, 1976: 188). His life is briefly outlined in R. Freed and S. Freed (1993: 150–156). He was a friend who aided us in our work and on occasion protected us. Once we were in a dispute with a taxi driver over the fare from Delhi to Shanti Nagar. Tippler happened to pass by. He took the driver aside and spoke to him forcefully for a minute or two. The driver left without further discussion. Tippler was not a man to trifle with, certainly not in his own village. He frequently visited us in the 1950s, but in the 1970s we generally avoided him, as did most of the other villagers. His decline was painful to see.

To support a costly drinking habit and a generally dissolute style of life, Tippler sold and rented land. The transactions are not included in our excerpts from governmental records, but he discussed them in an interview. After his father's death, he inherited 21 acres of one-rupee land. He sold 2 acres to a medical doctor from Delhi, an allopathic physician with an M.B.B.S. The doctor intended to construct a hospital on the land. Although no hospital had been built at the time of our residence—and some villagers doubted that it ever would be built—the doctor came to the village every Sunday and held a clinic, allegedly giving free medicine to his patients. Villagers said that he also planned to build a small temple as a way to win the villagers' favor. However, one man said that the doctor no longer distributed medicine but instead had installed a tubewell and was cultivating the fields.

Tippler leased 14 acres to a brick contractor on a five-year contract at Rs. 19,500 per year. The agreement stipulated that the contractor could remove soil to the depth of 4 feet to make his bricks. Thus, Tippler retained only 5 of his 21 acres for his own use. He did not cultivate this acreage himself but gave it on lease to a close Brahman friend. The lease is not listed in the patwari records.

Despite Tippler's reasons for selling land to the doctor from Delhi, which was tantamount to diminishing family resources to support a wasteful life, villagers did not disapprove of the sale, for they generally favored the doctor's plans for a hospital and temple. However, they criticized the leases implacably because the leaseholder, a brick contractor, planned to build a kiln and had the right to remove soil down to 4 feet to make his bricks. The land at the site of the kiln would be baked hard. Informants agreed that the project would destroy the land. One informant commented that when the money had been spent, Tippler would be finished and starve. Tippler's Brahman friend said, "A number of men are waiting for him to die or lose the land so that they can grab it."

We thought it unlikely that Tippler would lose his land. Although his drinking had visibly damaged his health, when sober he appeared to have lost little of his shrewdness. He was addicted to litigation, and at the time of our interview, claimed to have 10 or 12 cases in the courts. He had just emerged from a bitter dispute and lawsuit with his brother's widow. He lost the court case, it was reopened on appeal, and eventually the case was settled out of court with a compromise (R. Freed and S. Freed, 1993: 154–155). He was formidable, but this widow was just as tough. Were he to die, he would leave his own young widow and two sons, the oldest eight years.

Widows are quite capable of managing their family's interests, and the boys would take over when they grew up. Moreover, the widow could invite an adult male relative to live with her to protect the boys. Many scenarios are possible, but based on other cases of wastrel family heads, the most likely outcome after Tippler's death would be the sale of some land to retire any debts and then a gradual recovery.

The kiln, with its two tall smokestacks, was in operation during our residence. One informant said that Tippler had given the contractor permission to build a second kiln for an annual payment of Rs. 5000, but the second kiln had not yet been constructed. The workers at the kiln were almost all migrant laborers. They had built a settlement near the kiln. Their small houses had brick walls and thatched roofs. A man had opened a teashop at the side of the road near the settlement (fig. 7).

The Kumhar Potters were the principal caste employed at the kiln. Their chief job was to use their mules and donkeys to transport unfired bricks from the clay pits to the kiln. After the bricks are fired, the Potter removes them from the kiln and stacks them. Potters may also convey clay from pits to the area where bricks are moulded. Carrying loads, chiefly soil and bricks, in small cloth bags (*bora*) on the backs of donkeys and mules was one of the chief occupations of the Kumhars. Shanti Nagar had no brick kiln in the 1950s, but one was located in a neighboring village, and men of 9 of the 12 Potter families worked there. In the 1970s, four men of only 3 of the 17 families of Gola Potters worked at kilns, two of them at the kiln on Tippler's land. Transporting bricks at kilns was hard work. The Potters who stayed in the transportation business had carts and carried tomatoes to market. The work was relatively light and it paid better than labor at brick kilns.

Landowners who could not realize the full potential of their land because of a shortage of workers, either family members or hired labor, could resort to leasing out land or to sharing cultivation with a relative. There was also a third option—the contract system. It was used chiefly for vegetables, usually tomatoes. A farmer planted a field of vegetables and then sold the crop as it began to ripen. Contracting differed from leasing. The land itself was not taken on lease; instead the crop was purchased while still in the field. The system had significant advantages both for the landowner and the purchaser. After the sale, the purchaser assumed all subsequent responsibility. Thus the landowner avoided the problem of insufficient field labor, the time lost taking vegetables to market, the various fees and commissions in the market, and the uncertainties of price. The buyer had the advantage of inspecting the crop when it became visible and could therefore closely estimate the potential yield. He could tailor his bid to the expected yield, market price, and to any perceived weakness in the landlord's position.

The distinction of leasing and contracting was not always clear-cut. Basically, it was the difference between renting a field and buying a crop in the field. A leaser who plows a rented field himself is clearly a tenant. A buyer who takes a crop when the fruit is visible has a contract. There is an ambiguous situation: A man leases a field but the landlord plows it for him and may irrigate it as well. Most village opinion would consider this arrangement to be a lease. For example, a Leatherworker man said, "I rent land from [a Jat] for Rs. 2000 per acre. The Jat plows and irrigates the fields. I plant the tomatoes, pay for the fertilizer, and provide the seed." A woman



FIG. 7. Tea shop built by migrants working at the brick kiln.

Potter who rented from the same Jat said, "We take land on lease at Rs. 2000 per acre. The payment includes rent and plowing, but not seed." However, the alternative interpretation—that the the crop has been bought rather than the land rented—could be advanced to make a point. Thus, in the context of a landowner taking measures to avoid a claim to his land by a tenant, a Brahman landowner said:

These days only the crop is sold and the land is not sharecropped. The landowner plows and plants a crop and then sells it to someone. The buyer then cultivates, harvests, and sells the crop. Under this system, the buyer has no claim on the land. . . . There are two kinds of bargains. A man can buy a field when it is planted. The irrigation is done by the landlord. The second type of bargain is to buy the field when the fruit is visible and the buyer can make an estimate of how many tomatoes the field will yield. The landowner raises the tomatoes himself and then sells the [crop in] the field.

We consider the first type of bargain to be the lease of a field and the second type, the purchase of a crop.

The contract system was used both in the 1950s and the 1970s. We do not know its extent at either time, but informants said that it was more common in the latter decade, probably because vegetable cultivation had greatly increased. We became aware of the system one day in the 1950s when we visited a landless Leatherworker

shortly after he had purchased a field of tomatoes from a Jat Farmer for Rs. 50. Aided by a Potter man, he was sorting a large pile of tomatoes into heaps of larger and smaller tomatoes. The Potter was helping because he would later transport the tomatoes to the Delhi market. They filled a number of crudely woven wicker baskets, the smaller tomatoes at the bottom and the larger on top. Damaged tomatoes were set aside. At the time, we assumed that they were for household use. After more experience with vegetable cultivation in the 1970s, we think it was more likely that these tomatoes would be sold separately to be used in making chutney.

Despite statements that the contract system was increasingly common in the 1970s, it was used much less than leases. We recorded only a few comments about contracts and just three cases. A Brahman landowner and his nephew cultivated four bighas of tomatoes on equal shares. They then sold the crop to a Potter for Rs. 3300. This payment, which was more than the field would have cost under a lease, suggests that the crop was very good. The figure may also have been inflated to compensate the vendors' costs of cultivation that, under a lease, would have been borne by the cultivator.

We had the impression that vegetables were the crop almost always bought on contract, for all talk of contracts concerned vegetables, usually tomatoes. However, we ran across a case of the sale of a forage crop while it was in the fields, which suggests that vegetables may dominate conversation because serious money is at stake but that crops involving relatively little money may have escaped our notice. Walking in the fields one day in mid-December when the tomato harvest was in full swing, we saw a girl cutting berseem (a clover). Berseem is an important fodder crop. We stopped briefly to talk. She was the daughter of a Potter, and she told us that her father had purchased the standing crop from a Jat landowner.

The other contract that we recorded involved a landless Leatherworker who bought a crop of tomatoes for Rs. 15,000. The jump from the contract of Rs. 50 in the 1950s to one of Rs. 15,000 in the 1970s meant more than just a larger sum of money; it also represented a shift from a small family business to a larger enterprise with hired labor and financing by a Delhi businessman. The Leatherworker was a prosperous entrepreneur and something of a gambler. It was he who told us, "You have to think in a business way. You cannot be afraid to lose money. You have to take risks to make money." He could afford a bit of risk. He headed a joint family with five sons and only one unmarried daughter. Two of his sons had government jobs and between them earned about Rs. 1000 per month. He was very comfortable. However, his financial panache was not shared by one of his adult sons who said, "When we take tomato fields, I am always worrying about the crop, whether it will be good. Then I lose weight. [This year] we have taken fields for Rs. 15,000 and till now [January 27] have earned only Rs. 6000, so until it is Rs. 15,000 we will have to worry." There was still time to earn a profit. The tomato season ran until Holi in late March.

Three weeks after our interview with the Leatherworker's son, his father had thrown in the towel. There would be little or no profit. According to the Jat landowner who sold the crop to the Leatherworker, the Chamar would have suffered a loss except for a concession by the landowner. The Jat gave this account:

I sold [the Chamar] a standing crop of 22 bighas of tomatoes for Rs. 22,000. He inspected the crop and then bought it. I sold it because I thought that cold weather would damage it.

He used labor in the fields for which he paid five or six rupees per day. He also has fields in [a neighboring village]. He buys labor in Shanti Nagar for fields here and he also gets laborers from [the neighboring village]. He gets labor from all over. Women do the picking for Rs. 6 per day because it is not considered to be hard work.

[The Leatherworker] borrowed money from a commission agent [*arati*] and made two payments. He paid me Rs. 10,000 when we made the deal and a final payment of Rs. 12,000 15 days later. However, I refunded Rs. 5,000 because the crop was damaged by the cold. He showed his account books to me, and I settled for Rs. 17,000. After the settlement, there was still a remnant of the crop left in the fields. [The Chamar] recovered his labor costs from that, so he did not run a loss. However, I lost Rs. 5,000.

I did not sell tomatoes this year [except to the Chamar]. Many people came to me but I did not sell because I thought that the price would be low this year and I would have to make refunds. Other landowners do not return money when the purchaser suffers a loss. People like profits but cannot bear losses. [The Chamar] could have earned Rs. 50,000 if the crop had not been damaged.

Poor people cannot bear losses because they can hardly handle their household expenses. [We pointed out that in this case the purchaser was not a poor man.] I agree! There are no poor Harijans [now called Dalits]. It is merely a slogan that people are poor, a slogan of Indira Gandhi.

Although the Jat landowner said that the contract was for Rs. 22,000 and the Leatherworker's figure was only Rs. 15,000, it was the same contract. The Jat had a tendency to exaggerate. We never confirmed that a refund had been paid by interviewing the Leatherworker but it was possible, for particular families of Chamars and Jats had longstanding friendly relationships.

This Leatherworker had an impressive business based on contracts, but he was essentially a middleman. He owned no land and had not invested in capital equipment. His operation was closer to a family farm than to a large commercial farm. A man in a neighboring village had taken another step away from the family farm to a larger enterprise. He had invested in tractors and tubewells. Tractors were the most expensive piece of farming equipment then in use by individual farmers. Moreover, he handled much more land than did the Leatherworker. His case came to light in a long interview with a Brahman farmer concerning farm equipment. We asked him how much land a farmer should have to buy a tractor. He replied that 30 or 40 bighas would be enough. He continued:

But people with only 1 bigha can have tractors. A man in [a neighboring village] has two big tractors. He rents 200 or 300 bighas, installs a tubewell, and farms the land. He rents the land for two or three years. When

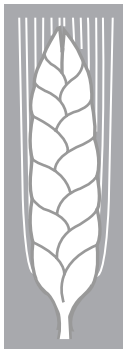
he is finished, he removes the tubewell or sells it to the owner of the land. [We asked about the danger of bhumidari rights.] There is no danger of that because the deal is only for one year [we assume that he meant one year renewable for an extra year or two]. The tubewell is not the complete outfit with the motor and shed but only the pipe and the fan. It is powered by a tractor. The installation is easy to remove. The tubewell of [one of the farmers of Shanti Nagar] was drilled by this man. The farmer bought it from him at the end of the contract.

Landowners did not seem to begrudge landless families their improved conditions but complained that it was sometimes at their expense. A Brahman landowner, talking about the Leatherworker with the Rs. 15,000 contract, said:

The Harijans do very well. They take a field of vegetables [tomatoes are the favorite] on contract from a landowner, harvest it and sell the produce in Delhi. The landlord plants the field but does not have enough family labor to harvest and sell the crop and cannot find hired labor. Hence, the system of contracts has grown up. It is important in the vegetable business. The system existed in 1958, but far fewer people were involved.

Two other farmers were present during this conversation, and the three landowners all complained that sometimes the Dalit (low-caste) contractors failed to pay the landowner who could do nothing about it. These contracts were all verbal. The landowners blamed the situation on the Government, which supported the lower castes. This alleged bias of the Government was a constant complaint of the high castes. In a different interview, a landowner recounted similar experiences with the rental of land. At one time, he rented out fields, but gave it up because he did not receive full payment. "No one returns full money and there are fights." He preferred to let a field lie fallow rather bear the aggravation of a dispute.

The relative paucity of contracts compared to leases might have been due to a lack of potential contractors. Leases were arranged earlier in the season than were contracts, which probably meant that people who intended to take on vegetable fields had already made their arrangements by the time the fruit was visible. One day we were in the fields with a Brahman landowner looking at his field of peas. We asked him if he would harvest the field himself. He said, "I'll do it myself if I cannot find a buyer. I also consider the current market prices. If prices are high, I prefer to harvest myself. If the price is not so good, I prefer to give the field of peas out on contract."



CHAPTER TWO

AGRICULTURE, KHARIF SEASON

WRITING OF INDONESIAN AGRICULTURE before the Green Revolution but after three decades that featured economic depression, war, occupation, Independence, civil strife, and runaway inflation, Geertz (1968: 125) concluded, "Bergson's extravagantly historicist aphorism very nearly holds: there is nothing in the present but the past. . . . [I]t is the same economy." The well-known equivalent French saying is "The more it changes, the more it's the same thing." Is the agriculture of Shanti Nagar before and after the Green Revolution the same thing? Is there more to the present than just the past?

If the Green Revolution is understood in its broadest sense—which would include developments in education and employment—then the economy of Shanti Nagar, whose principal component is still agriculture, was a different enterprise in the 1970s than in the 1950s. Even if the focus is narrowed just to agriculture and animal husbandry, there is one development that has made a huge difference: new sources of energy. Electricity and the internal combustion engine have replaced bullock power. This is a qualitative change, something different, not just more of the same thing. The new sources of energy made land consolidation mandatory, changed the composition of the cattle population, altered the cropping pattern, modified the fuel regime, opened the door to tubewell irrigation, and made labor much less onerous.

The National Commission on Agriculture (1976: 147) emphasized the change in social relations that went hand in hand with technological change: "[O]ne has to take note of the direction and content of the change in the agrarian social structure that has come about since Independence. The essence of the present situation is that Indian Agriculture is in a stage of transition from a predominantly semi-feudal oriented agriculture characterised by large scale leasing out of land and subsistence farming to a commercialised agriculture increasingly assuming the character of market oriented farming." The change, both social and technological, has been revolutionary. A modern style of rural life supplemented by urban employment now characterized Shanti Nagar.

There are two basic crop seasons in the agricultural year, the kharif (summer–autumn) crop and the rabi (winter–spring) crop. Generally, the kharif crop is sown in June through July and harvested from mid-September to mid-November; the rabi crop is sown from mid-September to mid-November and harvested from mid-March

through April. There is time between the two main seasons to grow additional *zaid* crops, usually vegetables or fruit. These seasons are known as *zaid rabi* and *zaid kharif*. *Zaid* (extra) kharif exists in principle, but there is no mention of it in the village crop chart, and we never heard a farmer talk about it. On the other hand, *zaid rabi* was in the crop chart for at least one year, farmers did talk about it, and some of them grew a crop during that season. For example, at the end of March, we saw a Brahman farmer preparing a field for *zaid rabi*. He said that he would grow *kachri*, a fruit or melon, and *tindi*, a vegetable. The *tindi* would ripen by the rains in late June or early July and the *kachri*, 20 days later. If the crop ripened in time and the field was dry enough to be plowed, the farmer would plant paddy for the kharif season. If the rain was heavy and the ground too soft to be plowed, he would leave the field for wheat during the rabi season.

The most striking difference between the cropping patterns of the 1950s and the 1970s was the effective replacement of sugarcane by tomatoes in the kharif season. The villagers said that a disease had begun to affect sugarcane so that its cultivation was inadvisable; also tomatoes paid better than sugarcane. The acreage of sugarcane declined from 374 bighas in 1958 to an average of 50 bighas in the 1970s and none at all in 1977, if the village crop chart is accurate. Vegetable farming was on the rise in the 1970s both in the variety of vegetables and the amount of land devoted to their cultivation. The increased acreage was chiefly at the expense of sugarcane.

Gram (chickpeas), the second most important rabi crop in the 1950s, may have been going the way of sugarcane. Its acreage declined from 658 bighas in 1958 to an average of 66 bighas from 1970 to 1977.²⁴ In 1977, the village crop chart records only 7 bighas in gram. If this figure is correct, gram has all but disappeared in Shanti Nagar. Like sugarcane, the sharp decline in its cultivation may have been partially due to a disease. A farmer told us that gram was suffering from an infection, and two farmers said that gram was no longer grown in Shanti Nagar, an exaggeration but also fairly close to the truth at the end of the 1970s. Moreover, no high-yielding varieties of gram seeds were developed during the Green Revolution. Gram lost out to more lucrative crops (Varadarajan, 1990: 57).

Farmers, especially Jats, occasionally mentioned the prestige associated with different crops. We encountered a Jat man lying on a cot beside his field while his wife and son sorted tomatoes. He surrendered the cot to us and sat on the ground. The farmer surprised us by saying that he would grow a little sugarcane, and this remark led to a discussion of sugarcane versus tomatoes. The economic advantage was clearly with tomatoes, but the farmer wistfully expressed a feeling of loss:

Wheat, gram, and sugarcane form one family [*khandan*] of crops. Vegetables such as tomatoes are a low standard of cultivation. Sugarcane is good for prestige. If you go to the market with wheat and sugarcane, you sit like a big man in front of the pile. But with tomatoes, you sit like a small man. In the vegetable market [Subzi Mandi], a lion and a goat are the same thing.

Sugarcane and gram are effectively gone, at least for the present, although sugarcane could stage a recovery if the price were right, as could gram. Wheat alone reigns supreme. It is the staff of life in northwest India.

Our discussion of agriculture highlights two main themes: (1) the shift from sugarcane to tomatoes, and (2) the modernization of farming that characterized the Green Revolution. The first theme is our point of entry into the kharif season. The second theme is best seen in the case of wheat, a rabi crop well suited to cultivation with tractors and threshers. Moreover, tubewell irrigation was necessary for the new high-yielding varieties of wheat.

SUGARCANE

Because little sugarcane was grown in 1977–1978, only 27 bighas, we describe sugarcane cultivation as it was in 1958 (S. Freed and R. Freed, 1978: 28–42). According to the village crop chart (*Goshwara*), 1873 bighas were cultivated during the kharif season. Although only 20% (374 bighas) of this cultivated area was planted in sugarcane, it accounted for approximately 55% of the gross value of all the kharif crops. In contrast, tomatoes occupied only 21 bighas. Twenty years later, the relative proportions of the two crops were reversed, 27 bighas in sugarcane and 749 bighas in tomatoes.

Sugarcane had qualities that set it apart from the other kharif crops. It was planted during the latter part of March or early April, well before the other kharif crops. Its harvest began at the end of November, after the other kharif crops had been harvested, and continued for some three to four months. After the cane had been cut, its roots were left in the fields to sprout anew the following year. From year to year, the yield gradually decreased until, after approximately four years, the old roots were dug up and there was a new planting. The old roots were used for fuel. Although a field often lay fallow in the rabi season preceding the planting of sugarcane, sometimes gram or peas were sown in the field. These plants served to increase the nitrogen in the soil. Because sugarcane generally had been removed from a field by the end of February or early March, it could lie fallow about eight months until a crop of the following rabi season was sown.

Making sugarcane into gur (unrefined brown sugar) or *khand* (raw white sugar) was the most complex of the processes by which villagers prepared agricultural products for home consumption or for the market. This feature of sugarcane was equally true in 1978. However, in later years, villagers did not prepare gur and *khand* themselves because there were not enough cultivators to justify the operation of a sugarcane press. Instead, they took their sugarcane to a factory.

Even in the 1950s, not all farmers were expert enough to process sugarcane juice themselves. Instead, specialists were often engaged for this service both from outside as well as within the village. The sugarcane crushers were rented from a company outside the village because neither the farmers nor the local blacksmith could maintain them. The use and expense of a crusher were shared by several farmers. Both sugarcane and tomatoes require considerable labor, even if cane is taken to a mill. The chief difference between the crops is the technical complexity of processing sugarcane and the need for specialists. Picking tomatoes and packing them in baskets for the market are simple by comparison.

Planting sugarcane required considerable labor; however, the work was well organized, progressed quickly, and with enough workers, a relatively large field

could be planted in a day. We watched two Brahman families who shared a 5-bigha (1 acre) field plant it with sugarcane in one day early in April. Stalks of cane that had been saved from the previous harvest and buried in a pit at the edge of the field to prevent them from drying served as seed. In preparation for planting, the field had been plowed twice before its irrigation and twice afterward. All but one of the members of both families assembled for the work: two men who were first cousins and the heads of their respective families, three women, and a number of children, three or four of whom were old enough to assist. In addition, a Jat Farmer man, a teenage Jat boy from the same family, a Bairagi Mendicant man who was a friend of the Brahman families, a teenage Bairagi girl, two Gola Potter boys about 10 to 14 years of age, and two Chuhra Sweeper men assisted for the day. An elderly Brahman woman, the mother of one of the family heads, also helped by bringing cooked food to the people working in the field, but she did not participate in any of the agricultural work.

To prepare the stalks of sugarcane for planting, the two Chuhra men cut them into lengths that contained two nodes. As one of the Brahman men plowed the field, children, teenagers, and women followed him placing the sections of sugarcane stalk lengthwise quite close to one another in the newly opened furrow (figs. 8, 9). The planters were supplied with pieces of cane by one of the Brahman women who car-



FIG. 8. Planting sugarcane. Children follow the plowman, placing sections of sugarcane used as seed in the furrow.



FIG. 9. Standard wooden plow with iron plowshare drawn by bullocks.

ried large basketloads from the place where the Chuhra Sweepers were working at the edge of the field and dumped the sections of stalks in heaps conveniently spaced along the furrows so that the planters never had far to go for a fresh supply. A Brahman man piled the pieces of cane so that they could be picked up easily. After the cane had been planted, the Jat Farmer man, operating a second plow following the first, closed the furrow by plowing another one close beside it; the displaced soil covered the first furrow.

The work of the planters did not appear to be organized; apparently they started their labors and stopped as they pleased. However, a sufficient number of planters were involved so that the second plowman was not delayed while the furrow in front of him was filled with pieces of sugarcane. After the planting was completed, one of the Brahman women walked over the field and picked up clumps of grass which had been uprooted. Then a heavy wooden plank (*mej*) was hitched behind each yoke of bullocks. With a plowman standing on the plank as he drove the bullocks, the plank was dragged over the field to smooth it first in one direction and then at a right angle to the first direction. One of the plowmen let Stanley try his hand at balancing on the wooden plank and driving the bullocks. Like much else in peasant agriculture, it was difficult to do. In fact, he couldn't do it at all.

The Jat Farmers were helping the Brahmans on the basis of labor exchange (*dangwara*); the Brahman plowman would reciprocate by assisting the Jats with their plowing. The two Sweeper men were paid Rs. 1.50 for the day and their food, the then-current rate for daily wage labor. We do not know how the Bairagis or the Gola Potters were compensated. Since the Bairagis were close friends of the Brahmans, we surmise that their participation in the plowing may have been on the basis of exchange labor. The Potter boys were probably paid cash.

Sugarcane had to be hoed and weeded (one operation) five or six times a year. This operation required one person's labor for one day per bigha on each occasion. As the sugarcane grew, it was necessary to tie seven or eight plants together for their mutual support to prevent them from lodging. This tying process, repeated three times every year, needed one worker for one day per bigha each time.

Some two months after the planting, any cane that had not germinated was turned to the surface in the course of hoeing and weeding. This cane was taken to the houses of the Brahman landowners where it was used as fuel. Landless people apparently had the right to collect such ungerminated cane for fuel. We base this conclusion on our observation of a Chamar Leatherworker woman collecting such cane in the Brahmans' field.

The foregoing account of our observation of planting, which involved six men, three women, a woman to cook and carry food to the field, and seven or eight teenagers and children, provides an idea of the labor requirements for the cultivation of sugarcane. On the day when we observed the sugarcane-planting, the usefulness of the joint family as a source of labor was well illustrated in an adjoining field where we observed the weeding of sugarcane. The plants had grown about a foot high. Two men and three women were at work; all were members of a Jat joint family that consisted of the families of two brothers and a first cousin. One of the men, a skillful plowman, guided the plow not only between the rows of plants but also back and forth between the plants of each row. The bullocks were muzzled to prevent them from nibbling the young sprouts. The second man (the plowman's brother), and the three women (wives of the men of the family) used long-handled hoes (*kasaula*) to break up the clods of earth produced by the plowing and removed the weeds (fig. 10). Weeding and hoeing required more labor than planting: a crop was planted only once in four years but it needed five or six weedings every year.

The sugarcane harvest, begun either at the very end of November or early in December, continued for approximately three or four months, well into March. Only the quantity of cane needed for a day's crushing was cut. The stalks were chopped with a cleaver flush with the ground, loaded on a bullock cart, and transported to the crusher. The leaves stripped from the cane were chopped into small pieces in a fodder cutter and fed to cattle. All the crushers did not begin operations on the same day. For example, sugarcane pressing began at three crushers on November 30; at another, it began on December 8. That three crushers began operations on the same day may have happened partly because it was Sunday, a day considered auspicious. Also, men with weekday city jobs could assist on Sunday. Similarly, the work at some crushers was finished earlier than at others, but all crushers were still functioning in early March, and some operators planned to continue until late in the month. The first gur

produced at each crusher was given away in the village. Sometimes, the first few batches of gur were not as clean as later ones and brought a lower price. At one crusher, we noticed that the first gur appeared to be of inferior quality. Its poor quality may have resulted from the farmers' rush to activate their crushers the day preceding the day of the new moon in order to avoid unnecessarily the loss of a day's work. Bullocks were not worked on the day of the new moon. The day after the new moon is inauspicious; an enterprise cannot be initiated on that day. Thus, if one began to press sugarcane the day preceding the day of the new moon, it was permissible to continue pressing the day after the new moon. However, failure to do so meant losing the time for crushing both on the day of the new moon and on the following day.

During the 1958–1959 season, eight sugarcane crushers were in operation in Shanti Nagar. Forty-seven families shared the eight crushers, an average of almost 6 families per crusher; the range was from 2 to 11 families. The most common arrangement was to share a crusher among some of the families of a single lineage (*kunba*). Jat Farmers, in groups of two, three, six, and seven families, operated four crushers under such an arrangement. Another group of five Jat families, representing a single lineage, shared a crusher with two Brahman families of the same lineage. Four Brahman families of the same lineage shared a crusher with a Brahman family of a different lineage and also with a Jat family. Five Jat families who represented four lineages shared a crusher. However, four of these Jat families who had emigrated to Shanti Nagar from Delhi in the preceding decade (they were therefore known as "Delhiwalas" in the village) could be considered almost a lineage.

The families who shared the eighth crusher were quite diverse in lineage affiliation: 10 Brahman families who represented five lineages and a Jhinvar Waterman family. At this crusher, there always seemed to be considerable tension in the air in contrast to the situation at the other crushers where a generally calm and amiable atmosphere prevailed. We are inclined to attribute this tension to the diversity of lineages represented; no single lineage comprised a majority of the families although five families were members of the same Brahman lineage. However, two of these five families were at odds with each other, a situation that would have tended to reduce the unifying effects of their lineage upon the other partners sharing the crusher.

Partners who shared a sugarcane crusher divided the expenses of its rental and operation in proportion to the quantity of cane that each partner processed. This proportion was measured by the number of pitchers (*ghara*) of juice to be produced which, in turn, was initially estimated from the number of bighas each partner had planted in sugarcane. The so-called pitcher was actually a tin can originally used either for kerosene, which held 18 seers of juice, or for cooking oil, which held 20 seers of juice. For example, the shares in one of the crushers operated by six Jats of the same lineage, measured in pitchers, were 10, 8, 8, 6, 6, and 5, a total of 43 shares. Thus, the partner with 5 shares paid about 12% of the expenses of the crusher. Each partner had two turns (*chakkar*, circle) per day at the crusher. An individual farmer cut the amount of cane that he would crush during the day, transported it to the crusher, and, when his turns came, used his own bullocks to activate the crusher to fill his quota of pitchers. When he had filled his quota of pitchers (equal to his shares), his daily turns were complete.



FIG. 10. Members of a joint family cultivating and weeding sugarcane. A Jat man maneuvers his plow between the plants while three wives of the family work with hoes.

The quantity of gur obtainable from a pitcher of juice increases slightly as the season progresses, the sugarcane matures, and the juice becomes richer in sugar. Farmers gave us a range of figures for the expected quantity of gur to be processed from a pitcher of juice, from 2.5 to 3.25 seers in December to 3.5 to 4 seers by February. At the crusher operated by the six Jats that we are using as an example, the farmers obtained 3.25 seers of gur from an 18-seer pitcher in mid-December. Because each partner had two turns, the crusher produced 86 pitchers of juice per day, the equivalent of 7 maunds of gur. At the beginning of February at this crusher, a pitcher was yielding 3.5 seers of gur, equal to a daily production of 7.5 maunds.

At another crusher, one farmer estimated its production at from 7 to 8 maunds per day; another farmer, at 5.5 maunds. A worker at this same crusher estimated the yield at 5 maunds. On the basis of figures provided by the Jhinvar Waterman who made the gur there, we calculated the production to have been between 5.5 and 6 maunds. The average crusher of Shanti Nagar apparently yielded about 5.5 to 7 maunds of gur daily. Partners divided the gur produced in proportion to their number of shares.

All the partners who operated a crusher shared proportionally the costs of renting the machine, or mill, that pressed the juice from the sugarcane, of maintaining the small shed situated near the mill, of buying the two large iron cauldrons in which the juice was cleaned and boiled, of buying or constructing the cooling tray, and of paying the stoker (*jhoka*) and the Jhinvar Waterman who made the gur, if the farm-

ers did not themselves do so. We use the term *crusher* to refer to the mill, but also, more frequently and inclusively, to refer to the entire installation used to produce gur: the mill, the furnace, the cauldrons, the cooling tray, and the hut.

The rental of the mill, Rs. 80 or Rs. 85 per season, included all repairs. However, these machines varied in quality; the farmers at one crusher, using a heavier, more efficient mill than normal, paid a rental of Rs. 125. If farmers failed to return the mill at the end of the season and the rental company had to fetch it, there was an additional charge in the form of an unrefunded deposit. For example, the farmers paid Rs. 90 at the beginning of the season and received a refund of Rs. 10 when they returned the mill. The two cauldrons cost approximately Rs. 150. They lasted for only three years, deteriorating because of the fire that constantly burned beneath them when in use. If made of wood, the cooling tray cost Rs. 10. Clay cooling trays were made by the farmers at no cost. Yearly maintenance of the hut cost about Rs. 25. These annual cash expenses amounted to approximately Rs. 265 or more.

In addition, the stoker (often aided by his wife or other family members) was reimbursed for his labor by 1 seer of gur for each maund produced; the Jhinvar Waterman was paid 1.25 seers per maund. Often the stoker was also allowed to take home a small quantity of sugarcane juice or gur in the evening. Throughout the day, there was a steady drinking of sugarcane juice and nibbling of gur not only by the workers at the crusher but also by visitors. The stoker and Jhinvar were paid 5.6% of the



FIG. 11. Sugarcane crusher showing the iron mill of the three-roller type, the long wooden beam by means of which a pair of bullocks or a single camel turn the rollers, and one of the large iron cauldrons used to boil sugarcane juice.

production of gur; if the drinking and nibbling were taken into account, the cost was probably about 6% of the total production.

Six of the crushers engaged Chuhra Sweepers as stokers; two hired Chamar Leatherworkers. All the stokers were from Shanti Nagar except for one Chuhra Sweeper who was assisting a local Sweeper. At three of the crushers, local Jhinvar Watermen processed the gur; at one, the gur was made by Jhinvars who came from Uttar Pradesh for the season; the farmers at the rest of the crushers made their own gur. Each partner provided not only his own bullocks to power the mill during his turns, but also someone to feed cane into the mill, and another helper to drive the bullocks. Exceptionally strong bullocks might continue to work without being driven; the one camel in the village, when blindfolded, continued to turn the crusher without being urged on.

All the mills used to crush the cane were of the three-roller type. Each mill was installed so that the rollers were vertical; a long horizontal wooden beam was attached to an axle that protruded from the top of the mill (fig. 11). Bullocks were hitched to this wooden beam and driven in a circle, thereby transmitting power to the axle to turn the rollers. The worker who fed cane into the mill sat by a vertical slit through which the sugarcane was passed to reach the rollers. The slit served not only to guide the cane but also to prevent a worker from accidentally having his hand caught between the rollers. The beam passed just over the head of the man feeding the mill as the bullocks plodded around in a circle. A kerosene tin fitted with a wooden handle, installed in a hole in the ground, was positioned to catch the juice as it ran from the bottom of the mill. As bagasse was extruded from the mill, the stoker collected it and spread it on the ground to dry. It was subsequently used as fuel. The juice was either temporarily stored in large oil drums that had been cut in half or it was transferred immediately to the cauldrons to be cleaned and boiled.

The furnace for cooking the juice was an underground horizontal tunnel under the two cauldrons that were used to clean and to cook the juice. The tunnel had an opening at one end for inserting fuel and removing ashes and another opening at the opposite end to allow smoke to escape. The smoke was carried off through a short chimney. The cauldrons were wide, relatively shallow circular iron pans with sloping sides and handles on the rims. The cauldron closer to the fuel inlet received more heat than the other and was the juice boiler (*karka*); the other cauldron received less heat and was the juice cleaner (*tanki*).

Juice was first poured into the juice cleaner where it was mildly heated and impurities floated to the surface. The impurities were skimmed off and placed in a kerosene tin; near the bottom it had a hole which was closed by a stopper (a bit of sugarcane). The tin container was placed so that the hole was over the juice cleaner. Periodically, the stopper was removed; the juice that had gathered near the bottom of the tin flowed into the juice cleaner. By this method, the impurities left in the can were concentrated. This residue was taken by the Chuhra Sweepers who worked at the crushers and was used to feed their pigs (or we think that possibly it was given in rotation to the Sweepers who served each of the partners because we saw one such Sweeper help herself to a pitcherful). Apparently, Chamar Leatherworkers had no use for the residue. At crushers where they were employed, it was given to Chuhra Sweepers.

To clarify the juice more effectively, okra (*bhindi*), also called lady's finger in English, was soaked with its leaves and branches in a kerosene tin of water. This decoction was subsequently added to the contents of the juice cleaner and juice boiler. Scum that rose to the surface in the juice boiler was returned to the juice cleaner. The juice was transferred from the juice cleaner to the juice boiler with a large ladle. It was boiled about one-and-a-half to two hours.

When the juice was almost ready to be removed from the boiler, approximately an ounce of mustard oil was poured into the juice boiler to prevent the juice from frothing. It was then stirred with a wooden ladle (*masand*) for about 10 minutes. During this phase of the process, the fire was no longer fed with fuel. It was important to judge correctly the precise moment to empty the juice boiler; otherwise, the juice might either be incompletely cooked or it might be scorched. Informants told us that few men in the village were successful in producing good gur batch after batch (fig. 12).

The juice was emptied into the cooler by two men who grasped the handles of the boiler and tilted it. Either a wooden or clay tray could serve as a cooler. Farmers who used a wooden tray said that it was superior because no clay was scraped off to become mixed with the gur while it was kneaded, and also that it was easier to move about. Farmers who preferred a clay tray claimed that a wooden tray was liable to develop leaks which had to be stuffed with cotton; besides, one cost Rs. 10.



FIG. 12. Brahman Priest, expert in making gur, sits behind one of the cauldrons in which sugarcane juice is boiled. Behind him are the stoker and the stoker's female assistant, veiled because she is married to a man of Shanti Nagar and must cover her face before village men senior to her husband. Begasse, used as fuel, lies on the ground to the left.

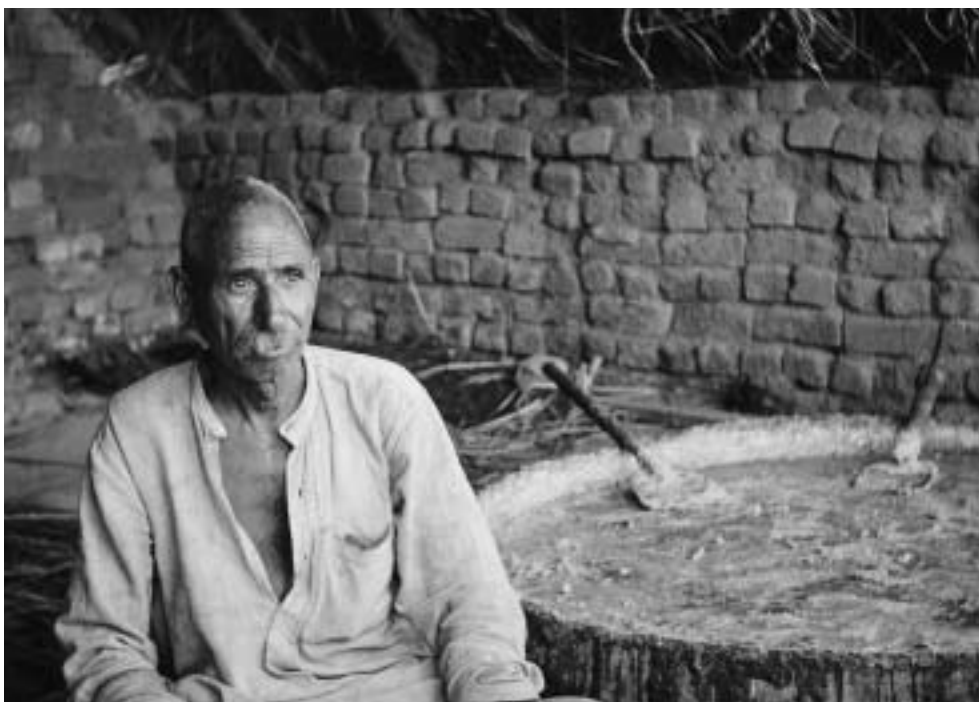


FIG. 13. Brahman Priest sitting in the hut at his sugarcane crusher. The large cooling tray is to his left; two spatulas for scraping up the solidifying gur for kneading and forming into cakes lie on it. The hut has brick walls and a roof of thatch.

The gur was considered to have cooled adequately to be kneaded when a small amount raised on a spatula and allowed to drip broke quickly and failed to form a continuous thread. At this point, the cooling gur was vigorously kneaded both with a wooden spatula and with the hands for about six or seven minutes, at which time it was formed into cakes, each weighing 2.5 seers. These cakes were temporarily stored in the small hut near the mill where they continued to solidify. Kneading the gur and forming the cakes might take place in the hut. Most huts had low brick walls, ridged thatched roofs, and were open at the front. Sometimes, small cakes of gur called *peris*, which weighed about one-eighth of a seer, were produced. Although such cakes fetched a better price per weight than the large ones, they required more work to produce (fig. 13).

Some farmers added a spoonful of a commercial white powder to the juice boiler. We did not learn its composition; it was known by the word meaning spice, or simply ingredient (*masala*). The powder was said to lighten the color of the gur so that it could be sold for a few annas more per maund. To make *shakkar* (brown sugar), this same powder was mixed with the gur in the cooling tray. *Shakkar* was made from gur boiled until it attained a high consistency so that when rubbed it became powder and remained so.²⁵

The speed at which it was possible to fill a tin of juice depended on the size and strength of the bullocks, the efficiency of the mill, and also on the speed at which a

farmer was willing to drive his bullocks. Powering a sugarcane crusher was hard work for bullocks; men also became fatigued if they tried to drive their bullocks too quickly. We timed the filling of five tins under normal conditions, that is, when farmers did not notice that we were consulting watches so that they would begin to race. The average time was about 12 minutes; the range, from 8 to 17 minutes. At one crusher, we watched a farmer fill his pitcher in 17 minutes; the succeeding farmer at the same crusher, however, seemingly working with greater urgency, filled his tin in 8.5 minutes. At another crusher, farmers filled their tins in about 12 minutes. When they became aware that we were timing them, they began to race and filled a tin in 7 minutes. Farmers were quite interested in the speed with which it was possible to fill pitchers. When they observed our interest, they recounted stories about record filling times of 5, 3, and even 2.5 minutes. The heaviest, most powerful mill of the eight in the village filled a tin in 8 minutes, and there the farmers did not seem to hurry. This mill also extracted more of the juice from the sugarcane than did the lighter mills. Although this particular mill was heavier and stronger than the others then in use and it was less strain on the bullocks, its rent was approximately 50% more than the rent of the lighter mills.

Although we did not time the number of hours that a crusher was operated in one day, we calculated an approximate total of 12 to 15 hours. For example, at the crusher with the heavy mill, 86 tins of juice were filled daily. A tin was filled in 8 minutes; consequently 11.5 hours of operation were required daily. It would be necessary to add to this figure a few minutes for each change of bullocks. With six partners each taking two turns, the bullocks had to be hitched and unhitched 12 times. Thus, the crusher was probably in operation somewhat longer than 12 hours during which time 7 maunds of gur were produced. Similar calculations for the other crushers yielded an average daily operation period of about 15 hours. The crushers did not operate every day. The day of the new moon was a day of rest for bullocks. Crushers also suspended operations on rainy days. In 1958–1959, there was at least one week of such weather; farmers reported that during the previous season the crushers were inactive for a month.

Farmers sold the gur that they did not retain for the use of their families. Some farmers preferred to make only enough gur for home consumption; they sold the balance of their sugarcane in the form of juice. At one crusher, the farmers sold juice on a contract basis to Jhinvar Watermen from Uttar Pradesh who processed it and sold the gur. The farmers' responsibility ended with the extraction of the juice. In mid-December, the farmers and the Jhinvars had contracted for 950 pitchers of juice at Rs. 1.15 each. Therefore, the contract was for 11 days because the crusher produced 86 pitchers daily. At that time, each pitcher yielded 3.25 seers of gur. Thus, the Jhinvars were paying Rs. 14.15 per maund for gur which they sold for Rs. 16, a transaction that yielded a profit of Rs. 1.85 per maund or about Rs. 13 per day.

The farmers considered the contract favorable to them because they could not produce gur of so good quality as that of the Jhinvars, and the best price that they could have obtained would have been Rs. 15. In addition, the Jhinvars were willing to make the smaller gur cakes. Although these required more work, they sold at a slightly higher price than the larger cakes. Under these circumstances, the contract

would be said to cost the farmers only 85 paise per maund; they were also saved no end of trouble by being relieved of the production of gur. Furthermore, when the farmers did make gur, both workers and visitors continually nibbled it as it was made.

When the contract expired, it was renegotiated depending on the price of gur at the Narela market and the quantity of gur yielded by a pitcher of juice. We recorded one of the subsequent contracts. In early February, a pitcher yielded 3.5 seers of gur and the Jhinvars paid only Rs. 1.19 or Rs. 13.60 per maund. Although the yield had increased by 7.7%, the price had risen by only 3.5%. We did not record the price that the Jhinvars were receiving for their gur, but a Jat Farmer had at that time sold some at Rs. 16.25 per maund. On the basis of this figure, the Jhinvars were earning a profit of Rs. 2.65 per maund.

Some farmers sold their gur to buyers who came twice daily from Delhi on specially reinforced bicycles with which they transported gur to the city. These buyers were interested in only the best gur. We were present at a crusher when one such buyer arrived. He talked a great deal, fast and loudly, and complained about the weight of the gur cakes. Each cake weighed exactly 2.5 seers, a situation which he compared with a dry river. He argued that each cake should weigh a little extra so that a maund would weigh 40.5 seers. He was referring to the fact that the type of scale used to weigh gur was a balance with weights in one pan and gur in the other. In his view, the two pans should not balance; rather, there should be sufficient gur to tip the balance. Before his arrival, we had watched these farmers as they weighed their gur cakes; they used only enough gur to balance the pans exactly. Although the farmers were somewhat embarrassed by the buyer's charge, they agreed with him. They said that they did not want their crusher to have a bad reputation. Then they argued about the price. One farmer said that Rs. 15 was the minimum acceptable price. The buyer offered Rs. 14.87. Another farmer immediately accepted this figure on behalf of the crusher.

Some farmers sold gur at the market in Narela. Such sales involved expenses that were not incurred when gur was sold in the village. To transport gur to Narela, a farmer had to hire a bullock cart because his own bullocks were in use at the crusher. Cartage costs were 6 annas per maund of gur, and Narela levied an octroi of 2 annas per cart. A farmer told us that it required four cartloads to transport only 38 maunds of gur to Narela. A cart could not be loaded too heavily because the gur cakes would be crushed. In addition to cartage and the octroi, a farmer paid a broker a commission of 2 pice per rupee (about 3%) to sell his gur.

Early in March 1959, gur was selling at about Rs. 18 per maund and *khand* (raw white sugar) at Rs. 30 to 35 per maund. This difference in price was sufficient to make the production of *khand* profitable; a number of farmers decided to produce it. To make white sugar, a great deal of labor and the rental of additional equipment were required. Sugar was not made every year. The year preceding our observations, according to our informants, the difference in price between gur and sugar was not enough to justify its production.

Raw white sugar was made in a centrifuge known in Hindi by the borrowed English word, machine. Centrifuges were rented from a neighboring village for Rs. 2 per maund of sugar produced. To produce sugar, liquid gur was boiled until crystals

formed in it. The liquid (*rab*) was stored in large metal oil drums which cost Rs. 18 or 19. A crusher used about four or five such drums. As a preliminary to pouring the liquid into the centrifuge, it was transferred in small portions to an earthen vat where a worker searched through it for lumps of gur that were squeezed between the fingers to pulverize them. It was important that the liquid have a uniform consistency. Two men turned a crank to cause the internal cylinder of the centrifuge to rotate until it was spinning rapidly. At this point, a bucket of the liquid was poured into the cylinder. The cylinder had a perforated wall. Molasses (*rala*) was forced through these perforations and then drained from the bottom of the centrifuge where it was collected in a bucket. The molasses was either added to a subsequent batch of *rab* and passed through the centrifuge again or it was boiled a little longer and made into gur. The sugar was deposited on the interior wall of the centrifuge. A farmer using a small pump sprayed water on the sugar deposited on the inner surface of the spinning cylinder to clean it further. After the liquid had passed through the machine, one of the farmers applied a brake to stop the cylinder. The base of the cylinder was removed and the sugar on its wall scraped off into a tray placed under the centrifuge. The sugar was spread on sheets laid on cots to dry in the sun. Informants reported that they could produce 13 to 15 maunds of sugar daily. We did not learn the proportion of a maund of liquid gur that was convertible to white sugar.

TOMATOES VERSUS SUGARCANE

The cultivation of vegetables, especially tomatoes, as a cash crop was an agricultural innovation that dated from the political partition of India and Pakistan in 1947. Some of the refugees from Pakistan who came to Delhi became involved in the vegetable trade. It was their activity and the increasing demand for vegetables in Delhi, a city that began to grow rapidly in the 1950s, that interested farmers in vegetable cultivation. In the 1950s, farmers described the large profits that, under favorable conditions, could be earned by raising vegetables, exceeding even those realized from sugarcane cultivation. Yet growing vegetables was risky, for crops were easily damaged by the weather or pests. According to informants, vegetable cultivation appealed to farmers who did not hesitate to gamble a bit. Still the situation was generally favorable for truck farming, and a gradual increase in the acreage devoted to vegetable cultivation seemed to be clearly in the cards.

What could not have been foreseen clearly, if at all, was that sugarcane would be replaced almost entirely by tomatoes as the dominant cash crop. The chief event that triggered the switch was a disease that ruined the village sugarcane crop. The villagers discovered then that tomatoes were generally more profitable than sugarcane, and they did not later revert to sugarcane when the disease might have died out or could possibly have been controlled. Just a few days after we arrived in the village in 1977, we were in the fields and asked a farmer about the great scarcity of sugarcane. In fact, we could see none at all. He explained, "Several years ago there was a disease that got into the sugarcane and ruined the village crop, so that people stopped growing so much sugarcane and switched to tomatoes." We commented that one could have problems with tomatoes too; there was a worm that ate them and could

ruin a crop. "That is true," he replied, "but there is a difference. The tomato disease would ruin just one field and not necessarily get into the other fields, but the sugarcane disease, once it got started, could ruin the whole village crop."

Of course, there was more to it than that, and, if asked, villagers would discuss in detail the relative merits of tomatoes and sugarcane, which suggests that they often think about the matter. Two weeks after the foregoing interview, we were about to leave the fields when a Potter man hailed us. We sat down with him and a Jat Farmer, his employer. The Potter earned Rs. 8 per day without meals, but had also leased (or had taken on contract) a field of his own. Several children were nearby, helping to pack tomatoes into baskets. They carried the baskets to the road where they would be picked up later by a cart.

The two men said that sugarcane had caught a disease that dried it up and so they had to plant something else. They discovered that tomatoes were better than sugarcane, and so they grew them from then on. The Jat said that the problem with sugarcane was that stokers had taken fields on contract and so were no longer available. We suggested using outside laborers from Bihar as are used in the wheat harvest. We suggested that the real reason that tomatoes had replaced sugarcane was that they are more profitable. The Jat Farmer would not agree. He said that it is not certain that tomatoes are more profitable. Sometimes sugarcane is better.

The two men then launched into a discussion of the relative merits of sugarcane and tomatoes to which the Potter contributed as much as the Jat, to the apparent displeasure of his employer. They said that the main thing about tomatoes is that the money comes immediately whereas the profits from sugarcane come at the end of the season. The Potter pointed out that sugarcane yields fodder, so wheat chaff can be saved. Also children nibbled sugarcane in the fields after school. Thus they are not as hungry at the evening meal and wheat is saved. They claimed that tomatoes required more labor than sugarcane. We raised the point of light labor versus heavy labor, noting that much of the labor for tomatoes was light work done by children whereas most of the work for sugarcane was done by adults. The two men agreed. We mentioned the considerable skill required to make gur. We never saw a child, or a woman for that matter, making gur. They replied that the only skill in tomato cultivation lay in the packing of baskets. An attractively packed basket could bring a higher price. However, children could pack baskets. They then raised the issue of susceptibility to unfavorable weather. Sugarcane was damaged less by rain and cold.

We finally asked both of them whether they preferred sugarcane or tomatoes. They both said that the difference is quick money. You begin to pocket it after less than two months, whereas it takes a year to get one's money from sugarcane. Other informants saw quick money as a disadvantage. Farmers spend a little at the end of the day, buying something for the children or perhaps taking tea before returning home. Some of the money just dribbles away. A frequently mentioned advantage of tomatoes is that they are out of the fields by Holi in mid-March or a bit later and they can be followed by a crop of melons or vegetables. Sugarcane is in the fields all year.

While our informants emphasized the fast money of tomatoes and the end-of-the-season money for sugarcane, the contrast is overdrawn. Farmers could sell gur and sugarcane juice throughout the season. Some farmers sold gur to other villagers. Some

farmers made only enough gur for home consumption, selling the balance of their sugarcane in the form of juice. They sold juice on a contract basis to Jhinvar Water-carriers from Uttar Pradesh who were experts in making gur. These were short-term contracts that had to be renegotiated frequently because of changes in the price of gur in the Narela market and the quantity of gur yielded by a pitcher of juice. Although the farmers did not receive their money every day, they did not have to wait more than a couple of weeks. One way to collect daily money was to sell gur to the buyers who came twice daily from Delhi on their bicycles specially reinforced for transporting gur to the city. Moreover, a farmer who had accumulated sufficient gur could periodically send some of it to the Narela market a few times during the season.

Therefore fast money does not appear to have very much to do with the dominance of tomatoes. The principal reasons, it seems to us, are that farmers can make much more money with tomatoes than with sugarcane, the work is easy and uncomplicated as compared to the production of gur and *khand* (raw white sugar), much of the work can be done by women and children, and other crops can be grown in a field after tomatoes, as mentioned by our informants. Sugarcane ties up a field for three or four years. Many men have urban jobs, and tomato cultivation fits the daily routine of urban workers very well. They can go to the vegetable market, sell their tomatoes and still reach their urban jobs on time. Now that Shanti Nagar is connected to Delhi by paved roads, it is easy to take vegetables to market even by animal-drawn carts, easier still by pickup trucks (*tempos*). The relocated Delhi Vegetable Market is much closer to Shanti Nagar than the old one. The village is perfectly situated for truck farming. In addition, tubewell irrigation favors tomato cultivation. Tomatoes require a small quantity of water weekly during the growing season. The supply of canal water was unpredictable; sometimes the canal was dry for periods lasting two months, a fatal situation for vegetables.

The advantages of sugarcane are that it is a tougher, more dependable crop than tomatoes and yields a little fodder. Too much rain can ruin tomatoes, but not sugarcane. A farmer claimed that the more it rains, the more sugarcane grows. Tomatoes can be ruined by a cold night but not sugarcane. The daily market price of gur is more stable than that of tomatoes, which makes tomatoes more of a gamble than gur. Gur can be stored, so if a farmer does not like the current price, he can wait for a more favorable one. Tomatoes have to be sold when they are picked, no matter what the price. Nonetheless, tomatoes are a better deal for the farmers of Shanti Nagar than sugarcane. The relative acreage devoted to each crop tells the story.

TOMATO CULTIVATION

Tomatoes can be grown either during the kharif or the rabi season, but during both our sojourns, they were a kharif crop, harvested in the autumn and winter. Nonetheless, considerable rabi acreage was devoted to tomato cultivation in the early 1970s. The peak year was 1971, when tomatoes were grown on 538 bighas. The acreage fell to 47 bighas in 1973. After that date, according to the patwari records, no tomatoes were grown during the rabi season. A problem with rabi tomatoes sold during the summer is their low price because of competition from lemons and mangoes.

In the 1950s, tomatoes were started in nurseries and transplanted to fields in mid-July after the beginning of the monsoon. Each field was plowed five times, rolled with a stone roller, and furrowed. The plants were set in a hole punched in the ground with a short stick. The blunt end of the stick was used to tamp the soil around the plant. During a rain when the ground was soft, a plant was simply pushed into the ground with the fingers. About one-twelfth of a kilogram of seed and a cartload of manure for fertilizer were used per bigha of tomatoes. Tomatoes had to be irrigated, weeded, and hoed. Family members usually guarded and harvested the crop.

The procedure was somewhat different in the 1970s. There were two or three different seeds available, but the early seed was little used. When early tomatoes are allowed to ripen, the skin often breaks. The variety grown in Shanti Nagar was Pusa Ruby. Villagers said that it paid better than other varieties because of its color, size, and yield. Farmers bought seed from the National Seed Corporation or from the Pusa Institute²⁶ at about Rs. 125 per kilogram. If his crop was good one year, a farmer might save seed for the following year. On several occasions we saw women and especially children squeezing seeds out of wormy or rotten tomatoes into a pot (fig. 14). They leave the seeds in the pot for five days and then wash them in water. Then they are dried. Different farmers gave much different figures for the amount of seed used for an acre, ranging from 200 g to 1 kg.



FIG. 14. Brahman women squeezing seeds from rotten tomato plants into a pot and a bucket. The seeds will be saved for use the following year.

The tomato season begins in the last week of August with the planting of seed in nurseries and is over by mid-March. Both the nursery and the field have to be carefully prepared so that the soil is fine with no lumps. This means that a field has to be plowed four times, at Rs. 25 per plowing. The nursery is irrigated and the seed is moistened. After the seed has been planted, the nursery is covered with a cloth or chaff so that birds may not attack it and moisture is preserved. Water is sprayed on the nursery every evening. After 25 or 30 days, the seedlings are ready for transplanting. A field is irrigated and the seedlings are planted in it. The field is weeded four times at intervals of six or seven days (some informants said two times, the first time five days after planting and the second, 25 days later). Between weedings, the field is irrigated, so that a tomato field is weeded at the maximum about four times and irrigated three times. Twelve men can weed an acre in a day or two half-days of four hours. The laborers were paid Rs. 3 for four hours. Some farmers fertilize their tomatoes, but others do not. Twenty-five kilograms of commercial fertilizer are used for 1 acre. Dung may be substituted for factory fertilizer. The procedure is to pile the dung around each plant.

The first tomatoes are ready to be picked about two or two-and-a-half months after transplanting, that is, about mid-November according to the informant who gave the fullest account. However, one farmer showed us his log for the tomato season, and he had picked one small basket (8 kg) of tomatoes in mid-October from a field of 8 bighas. He may have planted some early tomatoes instead of the later ripening Pusa Ruby variety. In any case, the season does not really begin to move until November. The quantity of ripe tomatoes gradually increases until, at the peak of the season from December to mid-February, an acre of tomatoes may yield 9 or 10 small basketfuls every two to four days. These figures are for 1977–1978, a bad year because of an infestation of *sundi* caterpillars (*Heliothis armigera*).²⁷ Informants said that during a good year, the yield might be 50 or so small baskets per acre at each picking. One farmer said that the peak rate might be 15 small baskets per acre every day, but tomatoes are rarely picked every day, usually every two or three days so that a farmer would have enough baskets to make a trip to the vegetable market worthwhile. Small baskets, made in the village by Jhinvar Watercarrier men, cost Rs. 2 and last for three seasons.

Tomato fields gradually went out of production long before the end of the season in mid-March. On February 8, we were talking with a Brahman farmer beside a field in which he planned to plant onions. The tomato plants that had been in the field had been cleared away and were piled high on the sides of the field. He said that he would use the plants as fuel for cooking. If a farmer wants summer tomatoes, he can irrigate the field and the dried plants will again start yielding tomatoes, but they will be small and sell for a low price. Dried plants are also sometimes plowed into the soil as fertilizer. In early February, some fields were finished and the plants had been removed while other fields were still going strongly and yielding lots of tomatoes. The fields still producing had probably not been affected by worms. Two weeks later we went to the fields and saw few people, most of them gathering fodder. We saw only one tomato field in action. A big pile of tomatoes was being sorted. We speculated that the Brahman farmer who owned the field must have made a small fortune from it.

Discussing the yield of tomatoes in 1977–1978 and the money made in their cultivation, farmers often remarked that the current year was a bad one, compared to the previous year, because of infestations of worms, insects, and the unfavorable weather. Farmers estimated that in infected fields, 30% of the crop was lost, amounting to about Rs. 1500 per acre. One farmer described what had happened as half due to nature, half to the desire for profit. He said, “This year, 1600 bighas [an overestimate as compared to the patwari records] were planted in tomatoes. This was because last year there were no worms and tomatoes were profitable. So this year people planted more tomatoes. Therefore, the worms came. This was a natural calamity.”

The worms in question were the *sundi* caterpillars. White ants (*dimak*) were the insect. One farmer, tracing a sequence of infestation from white ants to worms, showed us worm holes in some tomatoes and then pointed to some dark spots on the stems and tomatoes of some plants. He said, “These spots are the initial symptoms of the disease and the worms will follow. The yellowing of the leaves is due to the white ants that live in the soil.” Another farmer added a third factor—a lack of some nutrient in the soil—to caterpillars and insects as a cause of spoiled tomatoes. In this view, the lack of this nutrient causes the yellowing of the leaves. Some farmers say that the yellowing of tomato plants is simply due to lack of water. Farmers observed a connection between wind direction and *sundi* worms. One farmer said, “The problem is that the weather has been bad this year. When the wind blows from the west, it kills the *sundi* worms. However, there has been no west wind this year. The wind from the east is like food for the worms.”

In addition to creating favorable conditions for caterpillars, bad weather affected tomatoes directly. Two young farmers commented, “Tomatoes are fragile. The plants can be killed by too much water or by cold temperature.” A Brahman farmer showed us what a cold night (*pala*) does to tomatoes. They become soft and useless. A tomato has to have a tight skin to sell. The result of *pala* can be seen as well as felt. What seem almost like bruises appear on the tomato. There is a discoloration and a tight swelling. The skin loosens. The farmer said, “Tomatoes spoiled by *pala* are used as fertilizer. To eat them is bad for one’s health. One feels cold and can get a sore throat.” A Chamar Leatherworker who had taken 2 acres of land on lease from a Jat Farmer offered a different, rather cynical, interpretation of the fate of spoiled tomatoes. He said, “They are made into chutney. They sell for Rs. 2 per maund [40 kg per maund]. The manufacturers make a lot of money. They buy at a low rate and sell chutney for Rs. 1.50 per bottle.” Farmers also told us that damaged and diseased tomatoes are sold to restaurants. Rotten tomatoes also serve as a source of seeds.

There is said to be a defense against *pala* though we do not believe that it is widely used. On November 12, we came across a Brahman farmer who was broadcasting seed in his tomato field. We asked his son, who was standing at the edge of the field, what was going on. He said that his father was sowing mustard, which grows tall and protects tomatoes from cold weather, wind and dew. He added that a cold night can ruin a crop. Mustard is sown in straight lines in wheat fields. A line of mustard would offer some protection to tomatoes. Although we wrote that the mustard seeds were scattered, the planting may not have been as random as that.

Caterpillars can be a problem in November, but they die in winter. They all seem to have died before mid-December in the season of 1977–1978. Farmers apparently gamble a little, balancing the high prices of early tomatoes against the danger of an infestation of worms. Worms are not a threat to tomatoes planted later in the season, for they die before the fruit forms. Prices are highest in October, decline during November and December, before bouncing back in January, but again declining in February. According to a daily log kept by a Brahman farmer, he received an average of Rs. 10 for 26 baskets of tomatoes that he sold in October, Rs. 6.50 for 570 baskets in November, Rs. 4 for 543 baskets in December, Rs. 6.20 for 800 baskets in January, and Rs. 4.70 for 723 baskets in February. During early March, the end of the season, he sold 117 baskets for an average price of Rs. 5.85. Supply and demand determine prices.

The farmers know what is happening. On December 8, a farmer explained that the low current price, Rs. 4 or 5 per basketful, was because many tomatoes were arriving at the Delhi Vegetable Market from Ambala, 125 miles due north. He said, "After 10 or 15 days, the rates will be high and then we'll pick." As predicted, the rates recovered substantially. The price decline in February can probably also be traced to tomatoes coming to Delhi from elsewhere—Uttar Pradesh and Haryana. These tomatoes continue to arrive after the season is finished in Shanti Nagar. At the end of February, a commission agent (*arati*) in the Delhi Vegetable Market showed us tomatoes that had come from Rajasthan. They are said to be the best quality of all. A comprehensive study of the Delhi tomato business would necessarily involve an area much larger than the Delhi Union Territory.

Farmers are not helpless before infestations of *sundi* worms. They can fight the worms either by removing infected tomatoes by hand or by spraying a field with a pesticide (melatine). On November 15, before the cold weather arrived and killed the worms, we were passing by a Jat Farmer's field with seemingly perfect tomatoes. There were no worms at all. We asked the farmer how he managed to have healthy tomatoes since all the other fields appeared to be in trouble. He said, "I removed the infected tomatoes by hand. The worms can be stopped in this way." At the field of another farmer, we were given a similar explanation. We could see the spoiled tomatoes at the edges of neighboring empty fields where they had been thrown.

Many farmers used the pesticide melatine. Early in December we stood with a group of Brahman farmers looking at their field of very good, wormless tomatoes while one of them explained how they did it. "We used a pesticide and now the cold weather has come and the worms are finished." We said that other farmers claimed to have had no success with the poison. He countered, "All farmers in an area have to use the poison. If the farmer in an adjacent field does not use it, worms can come from that field into one's own even if one uses the pesticide properly." A Chamar Leatherworker was not as lucky as these Brahmans. He said, "When the trouble with the worms began, I took a plant to Pusa Institute [for diagnosis]. I spent Rs. 100 for the recommended poison. I mixed it with water and sprayed the plants, but the poison failed to kill the pests." We interviewed another farmer who also claimed to have had no luck with the pesticide. These mixed results suggest that some farmers do not use the pesticide properly or that their fields are reinfected from adjacent fields. However, American *sundi* is difficult to control with pesticides. It is hardy and has



FIG. 15. Woman picking tomatoes. A boonga, a conical structure for storing wheat chaff, is in the background.

developed resistance to many chemical insecticides. Pesticides need to be applied at the egg stage or on very young larvae to be effective, and even then it may be difficult to control an infestation (Vasdev, 2001: 2).

Harvesting tomatoes fell chiefly to the lot of women, girls, and boys. We did not record any cases of adult men picking tomatoes although they no doubt occasionally did so. The harvesters used baskets held against the hip (fig. 15). The baskets were the common *tokras* or *tokris*, the kind of large and small baskets used to send tomatoes to market. The harvesters emptied their baskets at the side of the field where woman and men sorted the tomatoes and packed them into baskets. The small baskets held about 8 kg and the large ones, about twice as much. Farmers recognized three grades of tomatoes: high quality, low quality, and spoiled. High quality tomatoes have a hard skin; those of low quality have a softer skin. Round tomatoes were more valuable than irregularly shaped ones; large tomatoes were worth more than small ones. When a basket was packed for the market, the small tomatoes were put at the bottom and the large ones on top. High quality tomatoes sold for about twice as much as low quality tomatoes. Buyers in the market made an additional distinction—the time that tomatoes could be kept without spoiling. A Jat Farmer, who was

not a tomato grower, explained, "I think that the reason that Jai Chand did better than Shri Pal with his tomatoes [in the auction at the Delhi Vegetable Market] is because there are differences between fields and the experienced buyers know that the tomatoes of one farmer will be superior to those of another. It is a question of differing chemical composition of the soil. It may be that Jai Chand's tomatoes will keep for a week but that Shri Pal's go bad in a day or two. The buyers know this and the difference is reflected in the price even though the tomatoes may appear to be similar." Experienced buyers knew all the tricks.

Packing tomatoes for the market probably required more skill than the other operations of tomato cultivation. In early December, we watched a man and a woman carefully packing small baskets. They had a transistor radio with them, but it was not playing. They loaded a basket with 8 to 10 kg of tomatoes, put a sheet of newspaper on top, covered the top of the basket with a cloth that overlapped the edges, and tied a cord around the basket just below the lip. The four corners of the cloth were then pulled tightly under the cord and folded back over the top of the basket, each corner tied to the one diagonally opposite. The tomatoes were held so tightly that the basket could be turned upside down and the tomatoes did not move. Securely packed baskets were essential, since they were placed on edge in a cart when taken to market.

We continued on through the fields and spotted a Chamar Leatherworker loading tomatoes into small baskets. Two sons of a Potter were watching him. They were



FIG. 16. A young Chamar Leatherworker and women sorting tomatoes and packing them in with baskets. The Leatherworker is landless but has rented 2 acres from one of the biggest Jat landowners in the village. This case is an example of the entrepreneurial spirit of many landless families.

there to pick up the tomatoes and take them to market in their cart. The Leatherworker was packing wormy tomatoes into a basket, and the Potters questioned whether such tomatoes could be sold. The Chamar ignored the comment and continued with his packing. This Chamar had leased a field, and the infestation of worms could have reduced his revenue to the point where he was worried about just breaking even. He needed every rupee.

A few days later, we encountered a young Farmer and three women from his household packing tomatoes into small baskets (fig. 16). We looked closely at the tomatoes, and most of them had no worms. Most of the wormy tomatoes were put into a large burden basket. The farmer said that this season was his family's first experience with tomatoes and that he didn't know how to load baskets. He did not do an especially artistic job, but nonetheless the baskets were loaded effectively. The group loaded 10 small baskets, 9 with good tomatoes and 1 with wormy tomatoes. All the baskets—including the large burden basket of wormy tomatoes—were carried to the side of the road where they would be picked up by Potters plying the road from the village to the Delhi market in their animal-drawn carts. Both the good and the wormy tomatoes would be sent to the Delhi market. The farmer expected to sell the good tomatoes for Rs. 5. Tomatoes then were selling for Rs. 4 or Rs. 5. The wormy tomatoes would fetch Rs. 1.50. We assume that this price was for a small basket. We don't know the fate of the large burden basketful.

There were several ways to send tomatoes to the Delhi Vegetable Market. Horse-, donkey-, or mule-drawn two-wheeled carts (*tonga*) were the most often used. This business was a monopoly of the Potters, the only caste then resident in Shanti Nagar that owned the necessary draft animals and carts. Four Potters owned one *tonga*, and one Potter had two. All carts were generally the same but differed in detail. We noted one cart with metal wheels and inflated rubber tires that looked like automobile wheels. The cart had railed sides; a cot double the width of a normal cot was laid on top of the sides so that a second layer of baskets could be put on it. Another cart was set up in similar fashion, but it had wooden wheels and solid rubber tires, that is, noninflated. A Potter cart-owner told us that the wooden-wheeled cart was faster but that his cart with inflated tires carried more baskets.

We watched a cart being loaded (fig. 17). Small baskets were lined up on their edges. Each line was six baskets wide. There were four lines in the cart and there appeared to be room for another two or three lines. Two layers of baskets could be stored in the bed of the cart and another one on the cot. Potters charge 50 paise (one-half rupee) per small basket and may earn Rs. 50 per trip if they carry a full load of baskets. Cart owners can sometimes make two trips a day, one in the evening and one at night. Cart owners generally leave for Delhi about 4:00 or 5:00 p.m. The trip to the vegetable market takes about one and a half hours. The driver takes each farmer's tomatoes to the commission agent specified by the farmer. Growers do not accompany drivers to the market. They take an early morning bus. Some arrive in time to auction their tomatoes themselves; others may arrive after their tomatoes have been auctioned, so they go only to collect their money.

Late in the afternoon, carts cruise up and down the main road running through the tomato fields. Farmers place their baskets of tomatoes earmarked for the Delhi

Vegetable Market along the sides of the road, and carts pick them up. We assume that there has been a prior agreement between a farmer and the driver. Sometimes a farmer hails a cart as needed and then carries his baskets to the roadside. Although there are many independent farmers and several cruising carts all in action at the same time, the work could not have been better organized if a dispatcher representing a single large company had been in control. The efficiency of this democratic, nonhierarchical system surely was equal to that of a single hierarchical company. However, the system is not free of relatively mild malfunctions. Near the end of February, a Potter's horse died, causing a shortage of carts.

Farmers occasionally used pickup trucks (*tempos*) instead of carts in sending tomatoes to market. No villager owned a pickup truck, but farmers told us that they were available in Saraspur, a village, and they could also be called from Delhi. Nevertheless, for small loads, the *tongas* were adequate. There were two other ways to send tomatoes to market. One way was on the roofs of buses. Bus transportation cost Re. 1 per small basket, twice the price of cartage. We met only two farmers who planned to use buses for their tomatoes. One farmer—with 20 baskets to send to Delhi—said that a cheaper alternative would be to take his tractor, which could cost him about Rs. 5 for the trip, but he had no license to run on the highway and there was always the possibility of an accident.

DELHI VEGETABLE MARKET

On Saturday, February 25, we went to the Delhi Vegetable Market. We would probably not have had another chance to see the tomato auction, for it was almost the end of the season. The tomatoes had gone to market during the evening and night. The farmers went there by bus early in the morning.

We arrived at the bus stop at about 4:45 a.m. Six or seven men were already there. A group of four men were huddled over a fire of some kind of chaff. Although Delhi begins to warm up in late February, it can still be chilly in the early morning. We recognized Brahmans, Leatherworkers and the only village Gardener. One of the Brahmans, Ram Kishan, said that he would take us to meet his commission agent, Om Prakash. During the next quarter hour, the group grew to about 30 men. A few were on their way to jobs, but most were going to the vegetable market. One of the Brahmans, Mogi Ram, who knew us well, talked and joked with us about going to America. There was some talk of agricultural business.

The bus arrived at about 5:10. Everyone rushed for seats. Ram Kishan bought our tickets. Mogi Ram saved us seats. Some people were standing when the bus left Shanti Nagar, and more boarded at the next village. The driver drove very fast, and the trip could not have taken more than 20 minutes. The roads were empty, not only the side road but also the Grand Trunk Road, and the bus really flew. We were sitting on the back seat and bounced high into the air on several occasions.

It was still dark when we arrived at the vegetable market, and the artificial lighting was spotty, casting shadows on the hordes of farmers rushing to meet their commission (or sales) agents (*arati*). Trucks and pickup trucks were pouring into the market. The scene was almost entirely male; very few women were about. We remember



FIG. 17. Loading baskets of tomatoes into a Potter's cart for transport to the vegetable market.

no idle chatter. Everyone meant business. For first-time visitors, the scene was tremendously exciting.

We accompanied Ram Kishan as he hurried to meet his commission agent, Om Prakash, a man used by many villagers from Shanti Nagar. The agent proved to be an educated man who spoke good English. Om Prakash had two assistants because he himself could not handle all the deals at once. Another sales agent, who dealt in vegetables, spotted us and approached to say that he would soon go to Los Angeles to join his cousin. He would be in the import-export business and deal in ready-made garments.

When we reached Om Prakash's area, business there seemed to be just starting, although the market otherwise appeared to be in full swing. However, we were told that some business is conducted at one or two o'clock in the morning. Om Prakash had rented a spacious area featuring a cement platform about 30 inches high reached by a two-step stairs. The area in general was dirty. In places, the walkways were covered with a fairly thick layer of crushed vegetables and mud. The steps leading to the platform were also dirty with mud and crushed vegetables. The platform was a little better but still rather dirty.

The market was divided into four parts labeled A, B, C, and D. Each part had a specialty: D was for vegetables. The auctions were held in enormous sheds of con-

crete with high ceilings and no walls where sales agents rented space. Om Prakash's space was located in part D, the vegetable wing.

Om Prakash's area was already full of baskets when we arrived. Most were still covered but farmers had started to remove the cloths that secured the tomatoes (fig. 18). Several buyers were there and we soon saw our first auction. A Jat farmer from Shanti Nagar had some large baskets of good quality tomatoes. There were two or three bidders in action. They rummaged in the baskets beneath the top layer and also lifted them to estimate their weight. However, no basket was weighed on a scale. Om Prakash handled the sale. He glanced at the tomatoes and fixed a minimum price of Rs. 20 per basket. Then Om Prakash asked for Rs. 22, and received a bid. Om Prakash asked the farmer if he would accept the price, but he declined. Then a very young man offered Rs. 22.50. Another buyer followed quickly with a bid of Rs. 23. The young man raised his bid to Rs. 24 and there was no further bidding. This price was equivalent to Rs. 12 for a small basket, a very good price, but it was the end of the season and prices may have taken a spurt. Ram Kishan told us that the young buyer was very active in the market. He purchased daily some 40 to 50 maunds of tomatoes which he sold to restaurants and shops.

We watched three farmers from Shanti Nagar, Ram Kishan and Mogi Ram, both Brahmans, and Hari Ram, a Watercarrier, who were showing their baskets in Om Prakash's area but handling negotiations themselves. Om Prakash played no role; he was busy elsewhere. However, he would still collect his commission and other charges. Ram Kishan had sent 10 small baskets and two large ones to the market the



FIG. 18. Farmers opening their baskets of tomatoes for display in the vegetable market.

previous evening. He said that some buyers wanted poor tomatoes, others wanted tomatoes of medium quality, and some wanted only top quality tomatoes. He had tomatoes of poor quality in the large baskets and those of better quality in the small baskets. He said that the tomatoes in the small baskets were good, but, as the sale later showed, they were not top grade.

An elderly buyer came looking for poor tomatoes. Ram Kishan told the buyer that he had two large baskets of low quality tomatoes and that Hari Ram had three, a total of five baskets. The buyer offered Rs. 20 for all five, but Ram Kishan and Hari Ram refused. Ram Kishan then said that he would sell his two baskets for Rs. 5 apiece, but the buyer stuck to his bid of Rs. 4. By this time, two other buyers and one of Om Prakash's assistants had arrived. The assistant asked Hari Ram how much he wanted for his poor tomatoes. Hari Ram asked for Rs. 7 per basket. The assistant then asked the buyers to accept the price, but none would agree and all three left. Ram Kishan told us that Hari Ram would get his price, pointing out that the tomatoes were mediocre but not really poor. Ram Kishan and Hari Ram were displaying their tomatoes on the ground in a walkway. Mogi Ram, the Brahman who joked with us at the bus stop, was sitting on the platform in the midst of his small baskets. There was no buyer near him.

At this point, a 22-year-old Brahman commission agent from Shanti Nagar called us. He was not doing any business. He had begun selling at 1:30 or 2:00 a.m. and was finished in an hour or so. We sat with him and chatted. He was a matriculate, that is, he had passed the tenth class. Then he went to work at the age of 15 or 16. He worked as a laborer at four different companies and also had a shop for a while in a Delhi village, not Shanti Nagar. He gave us tea and cake at a tea stall. His guru, an older man who had trained a number of *aratis*, dropped by. The young Brahman remarked that he was a good man and everyone respected him. He worked for his guru for one year for no payment while he learned the business. Then he knew enough to go into business for himself. He needed Rs. 4500 or Rs. 5000 to start. The money is necessary for paying farmers on the day of the sale, even if the agent cannot collect from the buyer until sometime later.

We went back to see how Ram Kishan and Hari Ram were doing. They both had sold their tomatoes. Ram Kishan had received Rs. 6.50 per small basket for the better quality tomatoes and Rs. 3.50 for the large baskets with the poor tomatoes. He had wanted Rs. 8 and Rs. 5 respectively. He had earlier been offered Rs. 4 for the large baskets but had refused. The total sale was for Rs. 72 from which would be deducted a commission of 5%, labor charges, and transport. After a sale, the buyer summons laborers who have large baskets. The laborers empty the baskets of the vendor into these large baskets and carry the tomatoes away.

Hari Ram did better than Ram Kishan. He received Rs. 7 per large basket for his poor quality tomatoes, the price that he had set in advance, but only Rs. 8 for small baskets of the good quality tomatoes. He had wanted Rs. 10. Nonetheless, both Ram Kishan and Hari Ram seemed satisfied. Ram Kishan said that Hari Ram's tomatoes were better than his. The Watercarrier's specialty was growing tomatoes. Mogi Ram also had a fixed price in mind, but we don't know if he received it. Ram Kishan remarked that he sells tomatoes with little delay even if he receives 50 paise less than

he would have liked because he was the working member of his family of three persons while Mogi Ram, with a son who was a wage earner and a six-member family, could afford to wait.

We were standing on the platform watching Om Prakash in action when a young Jat from Shanti Nagar, the son of one of the richest and most influential men of the village, joined us. He said that he wanted to show us the whole vegetable market, so we accompanied him. First we visited another *arati* from Shanti Nagar, a 36-year-old Jat with 50 bighas of land, which made him well-to-do. He had been a commission agent for only one year. He had been with us earlier when we took tea with the Brahman *arati*. The Brahman joked with him about becoming fat, and indeed he was putting on weight. He pretended to hit the Brahman.

The Jat sales agent gave us tea. He had only a few things left to sell. A woman buyer looked at some peas, but she and the Jat could not agree on a price. It did not seem to us that this *arati* had nearly the custom that Om Prakash had, but the Jat had been in business only one year. It no doubt takes time to build a clientele. Our guide said that this Jat commission agent paid Rs. 400 per month for his space. He let two other men operate in his area for what our guide described as a token payment. One of the village Blacksmiths was sitting with us. He had already sold his tomatoes, presumably under the hammer of the Jat.

We next went to the space of the sales agent where Harijans (*Dalits*) were selling their tomatoes. One of the Leatherworkers from Shanti Nagar bought us tea, our third cup. This *arati* handled Harijan clients but he himself was a Jat. In addition, the Harijans had a separate agent, but he also was not a Harijan. Our guide mentioned the progress of the Harijans as one of the outstanding changes that had taken place in the village. He noted that formerly they were agricultural laborers but that now many had jobs and they were also contractors. He named one Leatherworker family as having made the most progress because four sons were wage earners. We mentioned another Leatherworker family that had also made noteworthy progress because three sons had jobs. The Harijans immediately corrected us by pointing out that only two sons had jobs and two were in school, but they agreed that this family had certainly made progress. One of the great advantages of fieldwork in an Indian village is that almost everyone knows everyone's business. If you make a mistake, someone will correct you.

Our guide took us on a tour, explaining things as we walked. He showed us cauliflower being unloaded from a truck. It sold by the maund (40 kg). We saw small buyers who peddle vegetables in the neighborhoods loading their bicycles. One of them told us that he would have sold all his vegetables by 2:00 p.m. We passed by an area where tomatoes were being sold and saw two villagers, a Jat and a Leatherworker. Our guide had brought us there to introduce two men, former laborers in the market, who had become commission agents. Our guide asked them how much they earned but they did not tell.

We watched an auction of guavas. The sales agent, who did little but sit and stare at us, had two helpers: One kept the books and the other called out the bids. The buyers crowded around the baskets, inspecting the guavas as each basket was opened. These were buyers who sold in small shops or who peddled in neighborhoods. The buyers were able to inspect only the top two or three layers, for the baskets were



FIG. 19. A sales agent settling accounts with farmers after the auction.

large and deep, about 3 feet high. The guavas at the bottom were probably not so good as the ones on top. It took only a minute or two to sell a basket. One sold for about Rs. 18 but another went for Rs. 27.

We headed back to Om Prakash's area. The sale was all over and the agent was settling accounts with the farmers (fig. 19). About six or eight were sitting around Om Prakash, who had his book open and was handing out cash. It was 9:00 a.m. Just as the villagers had told us, everything was over by that hour.

We decided to leave. Ram Kishan wanted to accompany us back to the village but he still had to settle with Om Prakash. However he took us to a restaurant in the nearby village of Azadpur and bought us tea, sweets and salted snacks (*namakin*). It was our fourth cup of tea. Then we caught a motor scooter and were soon back in the village. Although our initial impression was that confusion reigned in the market, we soon realized that everything was very well organized. It could not have been otherwise. The Delhi Vegetable Market, then the biggest in Asia, could not have functioned unless everyone knew what he was doing. Near the gate to the market were some retail shops where we bought oranges.

FINANCE

The sales agents who operate in the Delhi Vegetable Market finance the tomato business. Formerly, the village moneylenders (*sauhukar*) were prominent in agriculture, but their day is done. None are left in Shanti Nagar. The sales agents lend money chiefly to landless farmers who take fields on contract or who purchase a standing crop.

Few landless men have enough money to pay landowners half their rent in advance as is the custom. Moreover, a landowner may demand the second installment early in the season rather than at the end, but another landlord might allow the second payment to be spread over three months. Landless men commonly rent a field of at least 1 acre. An acre of land usually rents for around Rs. 2000 although we recorded one figure of Rs. 2500. The lesser figure probably is rental for the season, that is until Holi in March. The larger figure was specifically for a whole year's rent.

If a farmer has taken a loan from a commission agent, he must sell all his tomatoes through that agent. He pays a commission of 7% on a sale; if the farmer has land of his own and does not have to borrow, the commission is only 5%. Other expenses are transport, Re. 1 for a large basket, 50 paise for a small one, and porters who earn 20 paise for a large basket and 10 paise per small basket. There is also a tax (*chungi* tax) of Re. 1 per large basket and 50 paise for a small basket. Farmers said that the buyer is supposed to pay the *chungi* tax, but a cynical farmer said that the sales agent and the buyer adjust the price so that in effect the seller pays the tax. We think that such manipulation would be difficult inasmuch as the auction is usually held in front of the vendor and he has the choice of accepting or declining the offered price. However, when the tomatoes are sold very early in the morning before the vendor arrives, the sales agent and the buyer might be able to manipulate the price.

The *chungi* tax irritated both the villagers and the sales agents. On January 10, 1978, the agents in the vegetable market went on strike over several matters, among them the *chungi* tax, which they insisted be eliminated. One villager said that the Government wanted to reduce the commissions of the sales agents. A villager who worked in the vegetable market said that there were at least three points at issue: the *chungi* tax, the imposition of a 1% tax on the commission agents, and the requirement that a representative of the seller be present during the auction. The 1% tax was apparently designed to give the Government a greater check on the daily business of the commission agents. It is the income tax that the Government has in mind. The agents are said to have a habit of underreporting their income. The strike was over in two days. During the strike, no tomatoes were picked because they could not be sold in the market. The day after the strike ended, there were more people in the fields than we had seen for weeks, almost all of them picking tomatoes. Besides, the next day was a Saturday and there would be no sale on Sunday morning.

The commission agent keeps all the money from a sale, paying the expenses and crediting the balance against the loan. Farmers who have not borrowed money or whose debt has been paid receive the balance after expenses on the day of the sale. In a bad year, a loan might not have been paid off by the end of the season, in which case the sales agent will carry the deficit over until the next season.

In addition to land rent, there are other expenses of cultivation. With a Water-carrier renter in mind, a Brahman farmer ran through them briefly. Most of his figures are only estimates, but they conform to the estimates of other farmers. Seeds cost about Rs. 60 and labor about Rs. 400 per acre. At this point in the interview, the Watercarrier happened to pass by and said that labor cost Rs. 500. A watchman was paid Rs. 200 for the season, an unusual expense. Irrigation and fertilizer are additional costs. Commercial fertilizer is preferred, at a cost of perhaps Rs. 25 per kila (acre),

but dung, a household product, might be used instead. Costs of cultivation, sales charges, and land rent at the normal Rs. 2000 per acre add up to about Rs. 3000. If a crop is good and rates in the market are high, which happens sometimes, a farmer can take in Rs. 5000 or more per kila. The profit could be as much as Rs. 2000 per kila. When this figure is compared to the wage of an agricultural laborer, from Rs. 6 to Rs. 8 per day, it is easy to understand why many landless men would prefer to rent land and become entrepreneurs than remain laborers. In a bad year, such as 1977–1978 when it was said that the yield of some fields was reduced by 30%, a renter might do little better than break even or even lose money. However, he might be able to renegotiate the land rent.

The above figures indicate that the expenses of tomato cultivation amounted to about 60% of the gross revenue when the rental of land was included. The profit in a good year might even then be Rs. 2000 per kila. A detailed analysis of the costs of sugarcane cultivation (S. Freed and R. Freed, 1978: 29–31) shows that expenses come to about two-thirds of the gross revenue. In 1977–1978, sugarcane (gur) was selling for about Rs. 120 per quintal. A good yield was approximately 29 quintals per kila. (The normal yield was 19 quintals per kila.) Thus, the gross return was Rs. 3480. After expenses, a farmer earned about Rs. 1150 under the most favorable conditions. Tomatoes had a clear edge over sugarcane even for a landless man who rented land. For a landowner who saved the Rs. 2000 cost of rental, the profit from tomatoes could be Rs. 4000, more than three times what could be earned with sugarcane.

Villagers made a similar comparison of tomatoes and wheat, but more as an intellectual exercise without practical consequences rather than as a consideration in choosing between the two crops. Tomatoes are a cash crop, and so is sugarcane, although some gur is kept for home consumption. Thus relative profit is the chief factor in deciding between them. The emphasis is different for wheat. Though an important cash crop, it is grown chiefly for home consumption. Villagers could shift from sugarcane to tomatoes with little trouble, but they could not abandon wheat for any other crop. It is the staff of life in northern India.

Another difference between wheat and the cash crops of tomatoes and sugarcane concerns varieties. There were few varieties of the cash crops and almost all farmers used the same ones, Pusa Ruby in the case of tomatoes, for example. Wheat was different. Farmers had the choice of many types that differed considerably in yield and price. The basic distinction was between indigenous (*desi*) wheat and the high-yielding seeds, both of which were represented by several varieties. Thus, comparison of wheat with other crops as to relative profit is complicated by the question of varieties.

However, the figures provided by one farmer can be used to give some idea of how *desi* wheat stacks up against a high-yielding variety and how the gross return of each compares with sugarcane and tomatoes. At the time of the interview, *desi* wheat was selling for Rs. 125 per quintal. The yield was 10 quintals per acre for a gross return of Rs. 1250. The price of the new variety was Rs. 110 per quintal and the yield was 13 quintals per kila for a return of Rs. 1430 per acre. These figures are dwarfed by both sugarcane and tomatoes. On the other hand, a farm family can handle 50 acres of wheat, if it has that much land, but only an acre or two of tomatoes. There are many variables to take into account in such an equation.

JOWAR

Jowar (large or great millet) was grown on more acreage in 1958 than any other kharif crop. An informant named three varieties of jowar: *narnol*, *desi*, and *lapar*, the latter described as "sweet". Farmers generally grew *narnol* because it was considered to be strong. It would not be attacked by worms. Jowar was used almost entirely for fodder although some grain might be harvested for household consumption. Because jowar was a mainstay of village livestock, it was not in danger of displacement by cash crops, such as tomatoes. Milk, butter, and ghee were vital in the village diet and for cooking. The commercial ghees and cooking oils were regarded as inferior to ghee produced in the home. Moreover, the sale of milk and ghee could be a lucrative business. A good water buffalo was a money-making machine.

In 1958, jowar was sown on 178 irrigated bighas and 450 *barani* (rainfed) bighas, a total of 628 bighas. In addition, 3 *barani* bighas of *chari* (a variety of jowar used only for fodder) were grown. Thus, *chari* was insignificant in 1958, as was true also in the years 1969–1977. For seven of those nine years, no *chari* was noted in the patwari records and only a small amount in 1977. In 1969, 462 bighas of *chari* were reported and none of jowar. We suspect that in this case, jowar was entered in the patwari records as *chari*.

During the interval 1969–1977, jowar was the most widely grown kharif crop for six of the nine years, surpassed only by bajra (a millet) in 1974 and tomatoes in 1972 and 1977. The area devoted to jowar varied from 249 to 699 bighas with an average of 484 bighas. It was grown on both irrigated (a mean of 224 bighas) and nonirrigated (260 bighas on the average) tracts. In 1958, 27% of the area sown in jowar ended in waste. We do not have comparable figures from 1978, but an occasional informant mentioned a spoiled crop, so obviously wastage still occurred.

High-yielding varieties of jowar have been available from about 1967–1968, but they have not led to an increase in the acreage devoted to the crop. The acreage has fluctuated from year to year, but overall there seems to have been a decrease. From 628 bighas in 1958, it dropped slightly to 584 bighas in 1970. It again dropped the following year, then recovered, then declined for two successive years before reaching its highest level, 699 bighas, in 1975. There followed two years of precipitous decline to a minimum of 249 bighas in 1977.

In fact, a decrease in acreage would be expected because the yield has substantially increased. Jowar is a fodder crop, and most growers, we believe, have what they need for household purposes. The grain is not sent to market, so jowar is insignificant as a cash crop. In any case, the average per-acre yield increased from 480 sheaves in 1958 to 780 sheaves in 1977. The decline in acreage characterized all of Delhi Union Territory. The Delhi Gazetteer comments, "Although high yielding varieties of jawar are also available, area under this crop has gone down to about 10,500 hectares during 1970–71 from 13,600 hectares during 1955–56. This would only indicate that under the agro-climatic conditions prevailing in the Territory, it is not profitable for the cultivator to go in for high yielding varieties of jawar. . . . The cultivators prefer cultivation of jawar for fodder purposes only" (Delhi Administration, 1976: 234).

The farming of jowar in the 1970s was similar to its cultivation in the 1950s. It was sown in late May through early July, according to farmers in the 1950s, or in late June and early July as reported in the 1970s. Jowar was harvested in late September through October. It is a rainy season crop, which means that not much irrigation is needed, but in September after the monsoon, it may be irrigated twice. No fertilizer is needed, but one farmer told us that after jowar is harvested, some fertilizer is necessary because jowar draws strength from the soil.

In preparation for jowar, a field was plowed from two to four times. Seed was usually broadcast, which wastes seed, but it could be sown more efficiently through a seed drill if a farmer owned bullocks. Seed requirements were from 2.5 to 4.5 kg per bigha. In the 1970s, informants said that jowar had to be weeded once. Family members usually did the work; when hired laborers were used, it cost Rs. 25 to weed an acre. In the 1950s, we were told that jowar was not weeded.

Jowar was not grown for grain and so its harvest did not depend entirely on the ripening of the crop. Instead, a family cut jowar throughout the season as needed by the family's cattle and buffalo. At the end of the season, family members harvested the remaining jowar. When workers outside the family were hired to harvest the crop, they received the standard 5% of the sheaves that they cut, though laborers usually preferred cash to sheaves. It cost Rs. 25 to harvest an acre of jowar. A family stored its jowar in the fields. Often a bed made of the stalks of rice was laid beneath the jowar to prevent it from spoiling. Every day, a few sheaves were withdrawn from the stock, chopped in a fodder cutter, and fed to the family's livestock. Some people used a few kilograms of grain for home consumptions. The grain was not sold. Sheaves of jowar were sold for fodder at Rs. 25–30 per hundred sheaves in the 1950s and double that price in the 1970s. A sheaf weighed about 10 kg. Sometimes, a farmer sold a standing crop, preferring that the buyer assume the expense and trouble of harvesting it.

Almost all our informants both in the 1950s and the 1970s told us that the farmers of Shanti Nagar did not sell jowar in the market. However, one farmer in the 1970s offered a detailed account of the marketing process with its revenue and costs. We trust his figures, but he did not tell us how many farmers sent jowar to the market in Narela. On this point we accept the testimony of all the other farmers: Jowar was rarely sent to market. Nonetheless, the figures presented by the dissenting farmer are of interest.

An acre of jowar yielded about 750 sheaves and about 10 quintals of grain. The grain sold for Rs. 110 per quintal. The sheaves, minus the ears, were retained for family use or sold in the village for Rs. 30 per hundred. Thus, the gross return for an acre of jowar could be as high as Rs. 1325. On the other hand, a farmer might choose to sell the jowar while it was still in the field for about Rs. 720 per acre.

The jowar was carted to the thresher at a cost of about Rs. 30 per acre. Household members cut off the ears which were then run through the thresher. Cartage to the market cost Rs. 2.50 per quintal, or Rs. 25 per acre. At the market, the commission agent charged 5%, and labor for cleaning and weighing the jowar took another 4%. Jowar is not a lucrative cash crop, especially as compared to tomatoes, and it is easy to see why very few farmers look at it from that point of view. Jowar is grown mainly for fodder.

BAJRA

Bajra (pearl, spiked, Indian, or bulrush millet) was extensively sown in the 1950s, ranking second in acreage to jowar among the kharif crops. From 1969 to 1977, bajra lost its second-place ranking to tomatoes. The average acreage sown in bajra during those years was 250 bighas; tomatoes were planted in 356 bighas on the average.

In both the 1950s and the 1970s, bajra was sown almost exclusively on *barani* land; of the 588 bighas sown in bajra in the kharif season of 1958, less than a bigha was irrigated. In the 1970s, 241 bighas of bajra on the average were sown on *barani* land while only 8 bighas were planted on irrigated land.

In the 1950s, 43% of the area sown in bajra ended in waste. We do not have comparable figures for the 1970s. The tendency of both jowar and bajra to end in waste has been noted by other writers. According to Narain and Narain (1932: 165) the proportion of waste in these two crops was always considerable. They suggest that canal irrigation was the culprit, diverting the energies of farmers to more lucrative kharif crops, such as sugarcane, and, at the time, cotton.

The crop rotation involving bajra in the 1970s was slightly more complicated than in the 1950s when it was generally preceded by wheat or gram and followed by gram. Vegetables—for example, okra, eggplant, and *tinda* (a kind of squash)—grown during added (*zaid*) rabi were an additional factor although relatively unimportant due to the scant acreage devoted to them. Bajra can follow *tinda* but not eggplant or okra. The difference is the length of time that the plants remain in the fields. *Tinda* ripens in one month but eggplant and okra continue for a longer time.

Bajra is sown during the last 10 days of June and the first 10 days of July. In the 1950s, a field was plowed once or twice. In the 1970s, with tractors available which made plowing much easier than with bullocks, a field was plowed three or four times. Seed requirements were 2.5 kg per acre. The seed is generally broadcast, though, like jowar, a seed drill can be used. Bajra is usually not irrigated because it is grown during the rainy season. However, if the rains fail, farmers can resort to irrigation. Fields were not fertilized with manure in the 1950s and rarely with factory fertilizer in the 1970s. Bajra had to be weeded once. If not enough family members were available for weeding, laborers were hired at a cost of Rs. 25 per acre in the 1970s. Never used in the 1950s, pesticides were available in the 1970s in case of need.

Because the grain on an ear of bajra is exposed to depredations by birds and because of the danger of theft, bajra had to be guarded constantly from the time that the ears began to appear. Men standing on the ground or on crude platforms at the borders of fields chased the birds away by hurling small pellets of dry clay at them with a sling (figs. 20, 21). The danger of theft, by no means confined just to bajra, was serious. Thieves visited the fields at night and broke off ears of grain leaving only the relatively worthless stalks; or else they stole sheaves that had been harvested and left in the fields overnight.

Bajra was harvested in October. When workers other than family members had to be used, they received the standard 5% of the sheaves that they harvested. In the 1950s, the average yield of bajra was 360 sheaves per acre and about 8.5 maunds of grain. Farmers said that the yield of grain in the 1970s was about triple that of the



FIG. 20. Farmer on platform uses sling to hurl pellets of clay at birds to drive them from a field of bajra.



FIG. 21. At sundown, a farmer slings pellets of clay at birds to protect a field of bajra.

1950s, a good harvest yielding about 600 sheaves per acre and about 20 to 25 maunds of grain. Hybrid varieties of bajra were introduced in the Delhi region in 1967–1968.

The bajra was cut close to the ground, tied into sheaves, and stored in the fields. Family members cut the ears from the stalks, which were used as fodder. The ears were spread out to dry, often on rooftops. Then they were carried to the family thresher or to another thresher if the family had none. It cost Rs. 2 per maund to thresh bajra, the same rate as for wheat. Threshers did not always do a good job of cleaning bajra, and some families supplemented the thresher by beating bajra with a wooden club, a method of threshing that we observed in the 1950s (fig. 22). The resultant mixture of chaff and grain was then placed on a winnowing tray and handed to a worker who stood on a low three-legged stool. With a light breeze blowing, the winnower gradually allowed the mixture to fall from the tray to the ground. The breeze blew the lighter chaff to one side as the grain fell to the ground in an approximately straight line (cf. fig. 49). The chaff was valueless as fodder. It was usually spread as bedding under cattle and might subsequently be used as fertilizer. It could also be used as fuel.

Bajra makes good bread and is also used in the preparation of other dishes. Therefore, families kept 2 or 3 maunds for home consumption and sold the rest in the Narela market. Transportation costs were Re. 1 per maund. The sales agent charged 5% and labor cost an additional 4%. Bajra sold for Rs. 110–115 per quintal; sheaves without the ears, for Rs. 30–35 per 100 sheaves.



FIG. 22. Landless Harijan woman threshing bajra with a stick, 1958.

PADDY

Paddy (rice with hulls) was a relatively minor crop in the 1950s. It was sown on only 99 bighas, 84 of which were irrigated. The paddy in *barani* fields failed to mature. In the 1950s before tubewell irrigation, paddy was heavily dependent on rainfall. Informants told us that the cultivation of paddy had been abandoned for a number of years. The increase of rainfall that began some five years before our residence led farmers to grow it again. Rainfall was not the only consideration that farmers kept in mind when deciding whether to grow paddy. When we saw the considerable amount of water in the fields during the kharif season of 1958 and heard farmers discussing the situation, we asked them why they did not take greater advantage of the water to grow more paddy. They explained that paddy was harvested late in the season. Therefore, only peas and fenugreek, a fodder crop, could be grown in the succeeding rabi season if a field was not left fallow. They added that no one needed much fenugreek or peas. Paddy in this regard resembled cotton, because both crops ripened late, their cultivation generally did not permit the sowing of either wheat or gram in the subsequent rabi season. At the time, gram was a major rabi crop. Wheat was and remains the indispensable food.

Paddy was still a relatively minor crop in the 1970s despite the Green Revolution that introduced new seeds, machinery, and factory fertilizers. In 1977, 128 bighas were planted in paddy, all but 5 of which were irrigated. The average acreage devoted to paddy from 1969 through 1977 was only 95 bighas, a figure almost equal to the acreage of the kharif season of 1958. Paddy was generally not successfully grown in the fields west of the village habitation site in the *bangar* (high) area. Most of it was grown east of the road to Narela in the *khadar* (low) area, which was four feet lower than the *bangar* fields and so accumulated more water. We visited some fields in the *khadar* area on November 2 and noted that the subsoil water reached to within about 2 inches of the ground's surface. Water was visible in several places. However, some paddy was also grown on *bani* land near the canal at the extreme west of the village. Moreover, we saw a fair amount of paddy being threshed west of the village, which meant that it had been grown nearby. It is very difficult to make absolute statements about many activities in Indian villages.

A young, well-educated Jat farmer, whom we ran into by chance in the fields, took time to expound his views on paddy, the new seeds, and the crop rotation. We encountered him standing quietly looking thoughtfully at his fields. We describe the ambiance of the interview in some detail to give an idea of the kind of commonplace events that often take place in the fields.

The farmer's wife was gathering fodder in nearby wheat fields and at the same time she was weeding them. The village zebu bull came wandering by and tried to enter one of the fields but was stopped by barbed wire. The farmer called to his wife to throw something at the bull to make it move along. It moved peacefully away and entered another farmer's unprotected field where it began to graze. Some children came running and drove the bull away. Women and children working in the fields and men observing, supervising, or resting was a common scene in the fields of Shanti Nagar.

The Jat was proud of his wheat field. He took us to see another one that had better seed in it. He planted several different seeds and then compared the yields. He was trying for a yield of 60 maunds per acre—a good yield was 50 maunds per acre—but had so far been unsuccessful. He pointed out that one way to judge the quality of wheat was by the density of the plants. In one field we could see the ground between the furrows. In the other field the ground could not be seen.

We examined a field of about 2.25 bighas. There had been paddy in the field and now there was wheat. We remarked that 20 years previously, wheat could not follow paddy in a field because there was not enough time to prepare the field for wheat. He replied that the new wheat seed required less time to mature than the old seed, about a month less. Moreover, they did not have good fertilizer in those days but now they do. He said that paddy is hard on the soil but the new factory fertilizers rejuvenate it.

At this point, the farmer shouted to a woman in his wheat field not to take the mustard, a crop often grown with wheat. There is a weed, *bathua*, that grows in the fields, both fallow and cultivated. The leaves and tender twigs are used as a vegetable and also in a yogurt preparation known as *raita*. Anyone is allowed to collect *bathua* in any field. The collection of *bathua* in effect weeds the landowner's field. However, the problem is that people sometimes pick mustard as well.

We asked why so little paddy was grown. He didn't answer directly but praised paddy, saying that it yields rice, fodder, and husks. The stalks of paddy could be used as fodder immediately when cut. However, paddy stalks are inferior as fodder. Cattle do not like them. The dry stalks could be sent to factories where they were chopped up and used to package crockery. The husks are eaten by horses, donkeys, and mules and sell for Rs. 10 per quintal. The farmer quoted a price for husks of Rs. 25 per quintal, but that figure probably represents the season when stocks of fodder are running low. Prices vary according to supply and demand. The harvest of paddy from his 2.25-bigha field was 6 quintals, a return equal to that of other farmers in 1977 and slightly more than half of what farmers considered a good yield. He said that he sold the paddy for Rs. 550 but later amended the figure to Rs. 700. The latter figure is more likely because it works out to Rs. 117 per quintal, the going rate in the market.

Another farmer was more direct in accounting for the small amount of paddy. He cited the vagaries of rainfall. He said, "I did not grow paddy this year. The rains were not favorable. There was no early rain in July and the late rains were too heavy. I planted a seed bed but when the early rain was inadequate, I sold the seedlings and planted tomatoes." Another farmer offered a similar explanation for his substandard yield of paddy, blaming too much rain, presumably late rain. The yield of paddy seems to have been generally weak in 1977.

The wheat field that we examined next had contained paddy in the preceding kharif season. The Jat asked us if we could see anything special about the field. We replied that we could not. He said that he had sown two different seeds in the field; half of the field had one seed, and half had the other. He would compare the yields and from then on use the best seed for planting in a field after he had grown paddy in it. With regard to such experimentation, he kept asking us if this indeed was not progress. He was very proud of his rational experimental approach to agriculture.

He showed us yet another wheat field sown in one of the new varieties, Punjab Kalyan, and noted that the wheat was stronger than in the field where paddy had preceded the wheat. He attributed the better crop to the seed. As this field was empty during the preceding kharif season, we suggested that the better crop could have been due to the fact that the field had lain fallow as much as to the quality of the seed. He had a good notion of the experimental approach except that he seemed unaware of the need to hold all factors constant except the one being tested.

It was growing late and we asked, as a final question, whether he had grown tomatoes. He said, "No, because my job would interfere with that work and I did not want to hire a laborer. I can afford a servant and have had two or three previously, but a servant has limitations. One cannot expect a servant to defend one's interests vigorously if a problem arises in the fields. I stand in my fields for two or three hours every day watching them. Then people see that the owner is paying attention."

Our questioning must have tired him because he asked us if he had detained us from something we wanted to do. We replied, "Not at all. We were afraid that we'd interfered with your work." He denied any inconvenience. "I was just standing here," he said, "so that when you came along I had someone to talk to." As we were leaving, we saw his wife carrying a heavy load of fodder back to the village.

The cultivation of paddy in the 1970s was quite similar to that of the 1950s. We base the account that follows on our information from both years, noting where appropriate the differences tied to the Green Revolution. Most of the differences involved the use of modern equipment, such as tractors and tubewells, and factory fertilizers. One dissimilarity that we expected to find was a significantly higher yield of paddy in the 1970s than in the 1950s because of improved seeds introduced dur-



FIG. 23. Watering a bed of rice seedlings. The water comes from a well at right.



FIG. 24. Woman drawing water for rice seedlings. A Persian wheel, at that time (1958) in disrepair, has been installed at the well. The Persian wheel is a device for drawing water from a well for irrigation. Bullocks, walking in a circle, turn the cogwheel, right. The motion is transmitted through an underground rod to the wheel, left, at the well. A continuous chain of containers activated by this wheel raises water from deep in the well to the surface where it is distributed to the fields through channels, left.

ing the Green Revolution. If the average yield of paddy in 1958, 15 quintals per acre, is compared to the yield that farmers obtained in 1977, about 14 quintals per acre, then the expected increase did not take place. However, 1977 was a bad year. The comparison of a bad year to an average year is deceptive. The proper procedure is to compare the yield for two average years. No farmer gave us a figure for an average year. However, an estimated average yield in the 1970s can be obtained by averaging a good year (24 quintals per acre) and a bad year (14 quintals), which works out to 19 quintals per acre. Thus, the improved seeds and other innovations of the Green Revolution appear to have raised the yield of paddy in the 1970s by about 27% as compared to the 1950s.

Paddy was planted in late May and the first half of June in seedbeds that—in the 1950s—were situated close to an assured source of water, usually a well (figs. 23, 24). In the 1970s, drawing irrigation water from wells in the fields was no longer practiced, the wells having been superseded by tubewells. The seedbeds were fertilized with dung, the seed was planted by hand, the seedbed was irrigated, and then it was covered by a cloth to protect it from birds. It was irrigated every three or four days until—after about 30 days—the seedlings were tall enough to be transplanted in the fields. Fields were plowed two to four times and irrigated before receiving the seedlings. There had to be two or three inches of water in the fields during transplanting (one

farmer said one foot). In the 1950s, the seedlings were transplanted in the middle of July after the arrival of the monsoon. In the 1970s, they were transplanted somewhat earlier, late June to early July. Farmers may have depended on tubewell irrigation before the arrival of the monsoon.

Transplantation was just as hard work in the 1970s as in the 1950s. It took about 20 laborer-days per acre (one farmer said 10) to transplant paddy from the nursery to the fields. If the field was small and there were enough family members, they could do the work. If an acre or more of land was involved, then laborers were called. They took the work on contract at the rate of Rs. 100 per kila. If there were 15 or so men in a gang, the work was done in one day. The field was irrigated again, if necessary, after one week. The field was never allowed to dry. Three or four days after transplanting in the 1970s, urea fertilizer was applied.

Paddy was labor-intensive. In addition to the hard work of transplanting, two weeding were required. The first took place 20 days after transplantation and the second, one month after the first weeding. Labor charges were Rs. 6 or Rs. 8 per day. It took at least 10 workers to weed 1 acre in a day. When the ears appear, a family member has to guard the paddy to protect it from birds. The birds attack the fields in the morning and evening, so the family member went at that time. Paddy ripened in 90 days if one of the improved varieties of seed was used or 120 or so days for the traditional seeds.

Paddy was ready for harvesting during the latter third of October and very early November. It was important to time its harvesting rather precisely; if the farmers delayed too long, the grain would begin to drop from the plants and some of it would



FIG. 25. Women threshing paddy by striking sheaves over upturned baskets. The grains fall onto a large cloth under the baskets.



FIG. 26. Watercarrier man and his wife threshing paddy by striking sheaves against a low mound of earth.

be lost. Mature paddy was cut close to the ground and laid on cots set up near the harvesters. The plants were then taken to the threshing area to dry. In both the 1950s and the 1970s, there were two systems for threshing paddy, neither of which used machinery. In one method, a large heavy cloth was spread on the ground and a large basket, bottom-up, was placed in its center. Workers grasped a number of stalks, swung them over their heads, and struck them forcefully down against the basket. The impact caused the paddy to loosen and to fall on the cloth (fig. 25). The paddy was then winnowed.

The second method was entirely different except that it also depended on manual labor. A Jhinvar Watercarrier explained the system. He dug a shallow trench in the ground and built a sort of low rounded parapet of hardened mud beside it. Standing behind the parapet, he struck the stalks of paddy against it and the grain dropped into the trench (fig. 26). He spread a cloth on the ground to catch the stray paddy. We saw him and his family using this method for threshing paddy in both 1958 and

1977. A Brahman farmer, well able to afford a large cloth, also used the parapet-and-trench method.

Despite the testimony of informants in the 1970s that the threshing and winnowing of paddy was often let out on contract, family members, chiefly women, were doing the work at the three threshing floors that we visited: the Watercarrier's, a Potter's, and a Jat's. On October 27, we ran into a Potter woman, son, and her small daughter in a field threshing paddy. The husband was away at a fair where he had gone to buy and sell the animals traditionally kept by the Potters: horses, donkeys, and mules. That we frequently comment on how hard women work in the fields should not give the impression that men are idle. They are often simply engaged in other pursuits, such as urban jobs or, as in this case, business activities.

This landless Potter family had taken a 2-bigha field on equal shares from a Jat farmer. On the ground were several cloths and a large rubber sheet on which lay two baskets turned upside down. The threshers struck a handful of paddy stalks against the baskets, dislodging the grain, which fell on the cloths. The young girl collected the stalks and tied them into bundles to be carried home and used for fodder. Paddy stalks are not good fodder for cattle, but the other animals kept by the Potters may like it better. We asked the Potters if they would have to stay in the fields that night to guard their paddy. They replied that they would take everything back to the village. At the time, it was about 5:30 p.m. and it became almost dark at 6:00. About 15 minutes later, we passed the field and the Potters were still there.

The third threshing floor that we visited belonged to a Jat. Leaving our house one day in early November, we encountered his son in the lane driving his family's tractor. He invited us to ride with him to his field. We mounted his tractor and rode to his field, which was in the *khadar* area near the railway. When we arrived late in the afternoon, we saw a threshing floor for paddy and four women and two men working there. Two of the women were daughters-in-law of the Jat owner and the other two were wives of village Barbers. We do not know the identity of the men, but they gave the impression of being laborers. A half dozen large cloths were spread on the ground. Large piles of winnowed paddy were on the cloths; the stems were piled around the circumference of the threshing floor.

The men were filling baskets with paddy and emptying them into a large tractor-drawn cart, locally called a trolley. One man filled a basket and helped the second man to lift it and place it on his head. He then carried it to the trolley and emptied it. In the meantime, his coworker filled a second basket.

The women were pouring paddy into nine large burlap bags—each alleged to hold 75 kg though some bags were smaller than others. After a bag was filled, they sewed its top closed with a heavy cord and a large needle. The bagged paddy was intended for home consumption. The rest would be sold in the Narela market. By the time the bags were filled, the loose paddy had all been put in the trolley and leveled. It nearly filled the cart. The items that had been used at the threshing floor were thrown on top of the paddy, and we rode back to the village. Everyone else walked back and arrived at the village before we did.

The Jat family had planted 1 acre of paddy and had harvested 14 quintals, a bit more than half of what was considered a good yield, about 24 to 26 quintals. The weak

yield had been due to too much rain at the wrong time and too little when needed. We commented that the paddy appeared to have been poorly winnowed. Paddy was winnowed in the traditional manner. The winnower stood on a three-legged stool holding a basket of paddy aloft and shaking it so that the paddy was gradually discharged. As it fell to the ground, a breeze blew the lighter chaff to one side, separating it from the grain. The Jat tractor-driver replied, "There was not enough wind to clean the paddy properly. We might winnow it again when the wind is stronger or take it to the market just as it is."

While planting, transplanting, weeding, and harvesting were still done by traditional methods, modern equipment was used for plowing, taking paddy to market, and husking it. Paddy went to the Narela market in tractor-drawn trolleys, which came in two-wheeled and four-wheeled models. A two-wheeler held about 60–65 maunds of paddy; a four-wheeler could be loaded with 80 maunds. Rice weighed more per volume than did paddy, so a two-wheeled cart could carry 80–85 maunds of rice and a four-wheeler 100 maunds. A trolley owner charged Re. 1 per maund for taking paddy or rice to market. There was a tax of Re. 1 per trolley for entering the market. The commission agent charged the usual 5%. Labor expenses, chiefly unloading a trolley and weighing the paddy, were another 2%. Most of the time, farmers sent paddy to the market and not rice. In 1977, two farmers said that paddy sold for about Rs. 115 per quintal, but three other farmers quoted much lower prices, about Rs. 75. In 1958, paddy was selling for about Rs. 20 per quintal. As for rice, three farmers said that ordinary rice brought from Rs. 150 to 200 per quintal. The best quality rice might sell for Rs. 220 per quintal. In 1958, rice sold for Rs. 50 per quintal.

Rice was produced by husking paddy. First, the paddy was dried, losing in the process about 25% of its weight. Then it was husked either in a stone mortar or at a mill. We saw husking in a stone mortar in 1958 but never in 1977. It is such hard work that mills were routinely used, both in the 1950s and the 1970s. The ratio of rice to husks was two to one, and so a quintal of paddy yielded 67 kg of rice and 33 kg of husks. A mill owner outlined his charges. He husked paddy for Rs. 5 per quintal if he kept the husks. If his client took the husks, the fee was Rs. 8 per quintal. The equation was precise. The mill owner simply added the value of the husks, Rs. 3, to his basic fee of Rs. 5 per quintal.

Two villagers operated mills in Shanti Nagar that were patronized by many families. The three usual power-driven machines were a wheat mill, a paddy-husking mill, and a fodder cutter. One of the mill owners, a Jat Farmer, had all three machines, but the other, a Potter, had only a wheat mill. At one time he had a husking mill but sold it, citing the small amount of paddy grown in the village and the fact that the Government had announced the imposition of a tax on paddy-husking mills.

MAIZE

Though only a small amount of maize was grown both in 1958 and the 1970s, it rated notice in the village crop chart kept by the village accountant (patwari). In fact, so little maize was grown that a knowledgeable farmer in 1977 flatly stated "People don't grow maize here." That may have been true in 1977 when the village crop chart

mentioned no maize. However the village patwari recorded maize in every other year back to 1969. The average acreage, 1969–1977 inclusive, was 26 bighas, close to the 19 bighas planted in maize in 1958. The account that follows is based chiefly on our data from 1958, which are more detailed than the information we collected in 1977.

In 1958, farmers had their choice of two varieties of maize: an early ripening variety and a late variety. The early variety, harvested in the second half of August, would appear to have been the better choice because there would have been time to prepare a field for wheat in the rabi season. The average yield of maize was 5 to 6 maunds per bigha and 50 sheaves of fodder. We do not have figures for the yield per bigha in 1977. Seed requirements were about 3 kg per bigha. A field was plowed two or three times. The seed was broadcast during the last week of June and the first week of July. Fertilizer was applied when the field was sown. If rainfall was insufficient, a field was irrigated a month after sowing and irrigated again a month later. Fields were weeded a few days after each irrigation. Fields had to be guarded, often by a family member to save paying a laborer a fee, which, according to a farmer in 1978, was one-quarter of the ears. Harvesting expenses were the usual 5%. Family members usually carried out the task of removing the kernels from the cob. When the poorer villagers ran out of wheat, they made bread from a flour of maize and gram, regarded as inferior to wheat bread.

Although maize is a grain, it was sold in the market as a vegetable and seemed to have that aura in the village where it was regarded as something of a delicacy. One day, the Baniya Merchant brought a supply of maize from Delhi to the village, parched the ears, and began to sell them. There was a brief flurry of excitement as villagers, especially children, ran to the shop to buy an ear.

COTTON

Formerly an important cash crop, cotton was a relatively minor crop in 1958, grown on only 53 irrigated bighas, and had declined in acreage even more by the 1970s when the average yearly acreage, 1969–1977, was only 13 bighas. It had dropped almost from sight in 1977, the village crop chart noting only 2 bighas of cotton. The decline of cotton appeared to be related to its inferior performance as a cash crop, losing out to sugarcane in 1958 and to tomatoes in 1977. In 1958, when enough cotton was still being grown to provide reliable data, the average harvest was 3 maunds of cotton with the seed per bigha at an average price of Rs. 20 per maund, including the seed. On the other hand, sugarcane yielded 10 maunds of gur per bigha at an average sale price of Rs. 16 per maund. In short, a farmer earned Rs. 60 per bigha with cotton versus Rs. 160 per bigha from sugarcane. Cotton therefore had become a crop that farmers generally grew for home use.

Cotton resembled the paddy that was grown in 1958 in that it was harvested late in the season—in October and November—which limited the choice of crops that could be grown in the subsequent rabi season. Farmers could not even be certain that the relatively hardy gram would produce a crop. Usually it was possible to grow only peas for fodder. However, fields were often left fallow during the rabi season after cotton had been harvested.



FIG. 27. Brahman woman spinning cotton in the family courtyard. The woman in the background is making bread.

The cultivation of cotton in 1958 and 1977 was similar. A field was plowed, hoed, and weeded two or three times. Fertilizer was not used in either year. Two newly introduced varieties—Japanese and American—were grown. Cotton was susceptible to rain, and an entire crop could easily be ruined. The new varieties withstood heavy rainfall better than Indian cotton, and in 1958 no cotton ended in waste. Family members customarily harvested the crop, periodically picking the field clean as the cotton matured. One farmer told us in 1977 that if laborers harvested a field, the payment was one headload of fuel per bigha. We assume that the fuel in question was the stalks of the plants.

Cotton could be ginned either in the home with a simple hand-operated wooden gin or it could be taken to a mill. Women said that cotton ginned by hand was better than that ginned in a mill. The advantage of the mill was that the work could be done quickly and considerable labor could be saved. Women carded cotton and spun it on a simple domestic wooden spinning wheel (*charka*) (fig. 27). The homespun thread was woven into a rough cloth known as *khadi* that played a role in India's struggle for Independence. Garments woven of *khadi* partially replaced the mill-made foreign product. Villagers generally sent their cotton to another village to be woven because there were no professional weavers in Shanti Nagar. However, at least one of the Mendicant Priest women know how to weave crude rugs or heavy bedspreads (*dari*). She had learned the skill from a social education teacher. The *khadi* era was effectively over by 1977.

The by-products of cotton were important. Cotton seed was boiled and fed to cattle. The stalks were burned as fuel. They were also used in the construction of

large dome-shaped covered stacks of chaff designed for its storage. The outer protective wall of each stack was partly constructed of twigs that were set into a trench and extended aboveground about three feet (fig. 50). The stalks of cotton plants could be used for this purpose.

SAN, SANI, AND DAINCHA

San (*Hibiscus cannabinus*) and *sani* (*Crotolaria juncea*) were minor plants in both 1958 and 1977 in terms of their acreage but important owing to their special function: They yield fibers that can be twisted into rope and cord for the webbing of cots. Because of their useful fibers, both *san* and *sani* have been called hemp. From a distance, the two plants appear to be very similar, but, when inspected closely, they are quite different. Their botanical difference and functional similarity are expressed in some of their common English names. *San* is sometimes called Deccan hemp or Roselle hemp. In Punjab, it is called *patsan*. *Sani* is called simply hemp or *San* hemp.

In 1958, only *sani* was listed in the village crop chart. *San* was not cultivated in separate fields and, perhaps for this reason, it was not listed. In March, *san* was sown as a border plant in sugarcane fields. After the first year, according to one farmer, the sugarcane roots spread so that *san* could no longer be grown. *Sani* was sown in June–July in its own fields, usually smaller than 1 bigha. During the kharif season of 1958, it was sown on 6 bighas of irrigated land. All of the crop matured.

Both *san* and *sani* were harvested from mid-September into November. Tied into bundles, the stalks of both plants were placed underwater in ponds where they rotted. *Sani* rotted in about 15 days, *san* in approximately 20 to 25 days. The bundles of *sani*, when removed from the water, were dried in the sun. *Sani* was then stored in the house; periodically, the fibers were stripped from the stems. The fibers of *san* were separated from the stems while the plants were still wet. The accumulated fiber was then dried in the sun and stored, ready for use. The stems of both plants were used as fuel. Although men of large landowning families could be observed occasionally making cord in their spare moments, this activity was a rather important source of income for old landless men. They could earn, in 1958, from 8 annas to Re. 1 for each seer of fiber twisted into cord; sometimes they were paid only 1 seer of grain, worth about 6.4 annas. It took about one day to twist 1 seer of fiber into cord. For comparison, agricultural laborers usually earned a daily wage of Rs. 1.50.

In 1977, *san* and *sani* were listed together in the village crop chart. The average acreage, 1969–1977, was only 4 bighas, and none at all was noted for 1977. However, this apparent absence was almost surely an error, for we saw people working with these plants. *Sani* was also combined in the crop chart with *gowar*, a fodder crop, and *daincha* (also *dhedhan*) (*Sesbania aculeata*). *Daincha* was basically used for fuel but it also produces an inferior fiber. Webster's dictionary describes it as a valuable forage or green-manure plant. One farmer told us that it did indeed improve the soil. Two or three crops of *daincha* neutralize alkaline salts known as *reh* that are toxic to plants. He had one acre of land affected by *reh*. He planned to grow *daincha* in the field and then would be able to grow a crop.

However, farmers and our observations indicated that daincha was used chiefly for fuel and only rarely—if at all—for fiber. That it was combined with *gowar* in the crop chart suggests that it could also serve as fodder, but no farmer ever mentioned that it was so used. In any case, villagers gave daincha fiber a low rating. With regard to stringing cots, one farmer said, “*Sani* is best, then *san*, and then daincha. A cot strung with *sani* will last 80 years; with *san*, only 8 or 9 years, with daincha, only 3 or 4 years.”

We did not record any daincha in 1958 and it took us by surprise. Just a few days after our arrival in the village in 1977, we were in the fields and spotted a crop in the distance that at first we thought was sugarcane. It turned out to be daincha. A farmer told us that it was a fuel crop. We said that we did not remember the crop from 1958. He replied, “There was a little then but now it is much more prominent. The problem is that there was land consolidation in 1971. In the consolidation, field boundaries were sometimes changed, the location of roads was changed, and some trees were cut down. The fuel supply was reduced so people began to grow more daincha as fuel.” There was some disagreement among farmers about the relative importance of daincha for fuel or for fibers. Only one farmer said that the fibers were important, even more important than the stems for fuel. The rest of our informants, more expert than the foregoing farmer, flatly stated that it was a fuel crop. The fibers were rarely used because they were weak.

Though *san* was listed in the village crop chart, combined with *sani*, we saw none growing in the fields or being processed—only *sani* and daincha. On one occasion at the end of October when we visited a Brahman family to take a census, we encountered a group of Brahman men, one of whom was twisting *sani* into a rope. They decided to test our knowledge and asked us if we knew what the rope was for. There was a trick in the question because the rope was thick and we were puzzled. They said it was to string a cot. We said that it was too thick. They showed us that it would be made thinner by soaking it in water, pulling it, and twisting it tighter by means of an implement consisting of an iron hook with a wooden cross at one end that acts as a whorl. The rope is hooked on the implement which is then spun. The crossed pieces of wood perpendicular to the axle give it momentum and the rope is twisted tighter and thinner.

Several weeks later in early December, we were walking along a lane when a Brahman man called to us to come and sit with him. He was sitting in front of a *baithak* (men’s sitting house) stripping *sani*. In short order, we were joined by several other men: a Carpenter, three Brahmans, and a man whom we did not know. We describe the session in context to give both an idea of daily village life and of typical interaction of villagers and ethnographers. Countless times, villagers called to us to sit with them. Inevitably, we and our host were quickly joined by other people, or else several people were already present when we were summoned. Conversations were often rambling. On almost all such occasions, the friendliness of the villagers was palpable. Such occasions made fieldwork not only pleasant but indeed possible. For convenience, we’ll call our host on this occasion, Mogi Ram.

A Brahman wife joined the group and said that Mogi Ram was half man and half woman because he knew all the songs that women sang at ceremonies and

special occasions. Everyone laughed. Mogi Ram was the only villager we knew who was upset when traditional gender roles were infringed. During this session he made comments that indicated a certain discomfort with women playing roles that he felt were inappropriate and with men who departed even slightly from what he regarded as correct behavior.

A Nai Barber was lying on a cot in front of the sitting house. One of the Brahmins picked up the stalks of *sani*, laid them on the Barber, and said that he was going to burn him. Then the others said, "We've been trying to kill him for years but he just won't die." The Barber replied, "The serious problem is not that I won't burn but that a Brahman cot will also be burned." The Barber was very well liked in the village and one of our good informants.

The conversation turned to another subject—the power of women judges that was equal to that of male judges. We asked if that was good. Mogi Ram said that women should not punish men. Someone said that it was the power behind the judge that punished. Mogi Ram said, "Nevertheless the woman did the punishing because she decided. It is not written anywhere that women should rule men." There was a general discussion about Indira Gandhi, who had been prime minister for many years. Someone remarked that she had been replaced by a government that would not last. Mogi Ram said that it was only natural. Indeed, after serving as prime minister for many years and then losing an election, mainly over the issue of forced sterilization, she later returned to power. The interim government did not last.

A bit upset by the discussion of women in power, Mogi Ram addressed Stanley, "You are wearing a proper shirt and have put aside your woman's shirt. You can wear it in America, but one should wear the clothes of the country in which you live." This comment harkened back to an earlier conversation that took place in the fields. Mogi Ram, displeased, told Stanley that he was wearing a woman's shirt. We were stumped. The shirt was one of several in a pile of men's shirts in a store where we often shopped. Save for the design, all the shirts were of very similar cut. We have no idea of what made this one particular shirt a woman's shirt. No one else ever commented about it.

The villagers jumped to another subject—card playing. It was one of the most popular recreational activities of men, and it was a rare day to walk through the village and not see a group of card players. The villagers opined that hard work makes for success but that one has to relax also. Stanley said that he had not played cards since he was a young man. The villagers observed that this was the reason that he had come to them as a Ph.D.

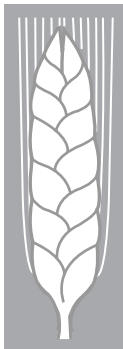
Having established to their satisfaction a permissive philosophical background for playing cards during the day, behavior often criticized by family members who were hard at work, a Brahman, the Carpenter, the Barber, and another man began to play cards. About this time, Mogi Ram finished with the *sani* and, except for the card players, the group dispersed. Mogi Ram pointed to the pile of stalks and said, "From here on the *sani* belongs to the women. When I picked up the stalks, I was doing the work of women." Mogi Ram was noticeably sensitive to matters involving gender.

GOWAR AND LOBIYA

Jowar, the principal fodder crop, was supplemented during the kharif season by *gowar* and *lobiya*. *Gowar* (field vetch), a leguminous plant, was grown in fields mixed with jowar or bajra or unmixed in its own fields. The village crop chart recorded 1 irrigated bigha and 37 rainfed (*barani*) bighas of *gowar* in 1958. *Gowar* increased the nitrogen content of the soil. It was sown from mid-June to mid-July and matured toward the end of November. It was possible to feed it to cattle gradually from the end of October to the end of November. The fields were then left fallow and prepared for the planting of sugarcane in March. Sometimes, gram was sown after *gowar*. Because *gowar* was harvested late in the kharif season, wheat could not follow it in the rabi season. The expenses of growing *gowar* were minimal, for fertilizer was not used nor were fields hoed or weeded. If a crop was sold, the buyer harvested it. The average yield of *gowar* was 150 to 200 maunds of fodder per bigha.

Lobiya, a kind of bean, was insignificant in terms of the area sown, only one-half of a bigha in 1958 according to the village crop chart. In fact, one wonders why the crop chart noted it at all. An early kharif crop, it was sown in June and harvested in August; therefore, it could be followed by wheat. Its cultivation expenses were similar to those of *gowar* and therefore minimal. The average yield was 100 to 125 maunds of fodder per bigha.

Gowar held its own in the 1970s. During the decade, 1969–1977, an average of 38 bighas of *gowar* was sown yearly, equal to the acreage of 1958. However, the average is deceptive. For the five years, 1969–1973, the yearly average was only 7 bighas. During the last four years, the average was 76 bighas. We can think of no reason for this sudden increase in acreage. *Lobiya*, of which there was next to none sown in 1958, completely disappeared from the crop chart from 1969 to 1977.



CHAPTER THREE

AGRICULTURE: FLOWERS, FRUIT, AND TREES

IN 1958, the village crop chart listed 40 irrigated bighas devoted to gardens of flowers and a variety of fruit, such as guavas, mangoes, oranges, bananas, and plums. Flowers were grown commercially only by the Mali Gardeners. They leased two gardens, one of 6.7 bighas in Shanti Nagar; the other, a rose garden, at a school in a neighboring village. They grew both flowers and fruit. They sold the fruit in the village and the flowers at the flower market in Delhi where they went every few days as the flowers blossomed and were picked. At the time, there were two families of Jhinvar Watercarriers in the village, and both leased fruit gardens, a total of 5 bighas, from Jat Farmers. Villagers very much enjoyed a little fruit in their diet. The farmers with fruit gardens possessed large landholdings. The ownership of gardens lent prestige, a motive that may have been of some importance to such landowners. However, the cultivation of both fruit and flowers were specialized activities. The great majority of farmers did not participate in this activity and had no intention of so doing.

The Malis also occasionally bought and sold trees. When a tree no longer bore fruit, it was cut down and sold. Because the Mali rented his garden in Shanti Nagar, the trees were considered the property of the Brahman landowner, even though the Malis had planted the garden. The Malis told us that they had just purchased a plum tree from the Brahman for Rs. 60. They expected to get some 10 or 11 maunds of wood which could be sold either in the village or in Delhi.

Flowers were more widely grown in 1977–1978 than in 1958, and farmers other than the Mali Gardeners grew them. Marigolds (*gainda*) were cultivated in many fields, often as border plants. In early November 1977, we were walking to the fields with a Chamar Leatherworker and passed a field of marigolds that belonged to him. The plot measured 5 *biswas* (0.05 acres), and was in the habitation site. He had received the plot in the land consolidation²⁸ and could have built a house there, but he chose to grow flowers. He said that there were problems with flowers, just as with tomatoes, which he also grew, but if there were no problems, both crops were a good deal. He claimed to harvest 10 or 12 kg of flowers per week. He sold them in the Delhi market for Re. 1 per kilogram and paid a commission of 5% to a broker. He took the flowers to Delhi by bus, for which he paid Re. 1, or sometimes by cart, which was not so convenient as the bus but cost less. He expected to harvest 2 quintals of flowers from the field. All his figures are of course estimates, and we have no other fig-

ures against which they can be compared. The Chamar described himself as a poor man, which meant that he had no salaried employment and no land. For him, every rupee was important.

On February 10, a Brahman farmer called us over to his field to chat while he and his son were sorting and packing tomatoes. We saw many marigolds in the fields and asked the farmer about them. He said, "These flowers are not sold. They are used in marriages. Of course, flowers are sold in the Delhi market, but not these. I have been working here on my tomatoes for two months, and the marigolds have created a wonderful atmosphere in which to work."

We talked about the lack of trees in the fields. He said that most of them had been cut down because of land consolidation. In the case of a valuable fruit tree, the new owner might pay compensation to the previous owner. As an example, he indicated a very large, conspicuous mango tree in the fields west of the village. The new owner of the field had paid the old owner Rs. 300 for the tree. We asked the Brahman about mulberry trees, for they are valuable for their withes, which are used to weave baskets. He said, "They are not cut down and there is no payment for them. They are given to a new owner of a field as a goodwill gesture."

The next day, a Jat farmer with land in the *khadar* area was showing us his crops. His land was covered with *shor*, and he was experimenting with various crops—onions, garlic, and marigolds—trying to find plants that would do well in alkaline soil. He said, "I am fighting the land." He had planted some wheat, but it looked very weak. The tops of the garlic leaves had turned brown, but at least the plants were still alive. He had for the first time prepared several plots for onions and one field for marigolds. He had a city job, and we remarked that marigolds would have to be taken to market every few days. He replied that it would be no problem. He would go to the market before he went to the office.

The Mali Gardener, 54 years old and uneducated, was deeply involved in the cultivation of flowers and fruit. It was apparently his only source of income. His two sons, both with high-school educations and presumably capable of finding salaried employment, nonetheless worked as gardeners in the family business. The Gardener evidently made a good living from his gardens, for he had married off six daughters, an expensive obligation.

The Mali owned the 6.7 bighas of land that in 1958 we recorded as rented from a Brahman. He probably acquired the garden because of land reform legislation, but in any case he owned it. Gardens were not affected by land consolidation, and so the Mali neither gained nor lost land in the consolidation. In addition, he rented for Rs. 1700 a second garden of about one acre from the Brahman from whom his family rented in 1958. They no longer rented the rose garden at the nearby higher-secondary school. He said that the contract had been for only three years.

Our first interview with the Mali took place on November 23, 1977. At that time, he said that he went to Delhi every third day to sell roses. They were sold by the kilogram for three or four rupees except during the marriage season—roughly from sometime in the first fortnight of November to the monsoon (S. Freed and R. Freed, 1998: 163, 165)—when the price shot up to Rs. 100 per kilogram. He grew mangoes (his chief fruit), papayas, guavas, plums, and some eggplant, the last presumably for

home consumption. He did not say where he sold the fruit, but most likely he sold most of it in the village, as was the case in 1958.

At the end of March during the Holi (a festival) season, we visited the elder Mali Gardener for the last time. He saw us coming from a distance and waved to us. It was a good omen, and he gave us each a rose. An interview with the Malis was usually hard going, both in 1958 and 1978. The Mali was friendly enough. It is simply that some people are easy interviews and some are difficult. He tended to be a bit difficult but was by no means the worst in the village. However, a difficult interview can sometimes yield more information than an easy one, and the Mali was always informative. It was mid-afternoon and he was busy picking marigolds with his son when we arrived. When he stopped working to talk to us, one of the women of the family came to relieve him. His garden was enclosed by a fence composed mainly of bushes to protect it from children and cattle.

Roses were the most important of the three flowers that he grew. Marigolds and an unidentified white flower were the other two. He said that he went to the market daily—previously, he had said every three days, but that was November and this interview was in March—picking his flowers for the day in the early morning, in time to catch the 5:00 a.m. bus to Delhi. However, marigolds had to be picked during the preceding afternoon, as they cannot be picked in the morning. The market was still where it had been 20 years earlier. There was only one commission agent for the whole market, but he had about a dozen assistants. The commission was 1 anna per rupee (6.67%—previously it was given as 5%). He carried the flowers to the market himself, and so there was no charge for a porter.

We asked him which were more profitable, flowers or tomatoes. He replied, "Tomatoes are more profitable but they cannot be grown on my land. There is too much *shor* in the soil. My soil is the same as that just outside my garden on which nothing is grown." We asked him if he had ever been tempted to take a field of tomatoes on shares. He said, "No. The rent for an acre is Rs. 2000 and there are expenses for fertilizer and so on, so that the total cost is Rs. 3000. It is hard to get Rs. 3000 out of a field of tomatoes." His comment that flowers could be grown in soil mixed with *shor* hearkens back to the Jat Farmer's experiment with marigolds in his alkaline field. Perhaps the Jat had been influenced by the example of the Mali.

As the interview was coming to an end, we remarked that for him nothing much had changed in 20 years. He replied, "One thing has changed. There is much more cheating these days than there used to be." He seemed very bitter about something. We took a guess that he might have had some problems during the land consolidation, but he said that he had neither gained nor lost land. His garden had been treated as a "property" because of the trees and was not affected by land consolidation. Then we recalled interviewing him a month earlier about festivals, in the course of which he talked at some length about marriages, especially that of a recently married daughter. He said, "Arranging a marriage and finding a groom are difficult jobs. I can search for six months or a year. Sometimes the clans are wrong or the boy is weak. The boy's parents might ask me to spend Rs. 5000 or Rs. 10,000. How can I do this? During the marriage season, boys are sold. People are swindlers and they're greedy for money. I married off my older son five years ago and have still not repaid

the loan of Rs. 5000 that the marriage cost me." So the source of his bitterness was probably the cost of marriages, the bane of the average Indian family. He had paid for the marriages of six daughters and still had one to go, a crushing burden. He asked us to take a picture of him holding his seven-month-old grandson, the first fruit of the marriage that cost him Rs. 5000.

The relatively large gardens on agricultural land do not account for all the fruit grown in the village. Some villagers had fruit trees on their plots in the habitation site. The cattle sheds (*ghers*) often had adjoining open spaces which could be used to grow some fruit trees, vegetables, and special crops, such as tobacco and spices. A kitchen garden at or near a *gher* was a new and prominent feature of village life in the 1970s. It probably had to do with the enlargement of the village site during land consolidation which made plots available for distribution. These gardens were neat and well tended.

A Brahman farmer, whom we have called Mahabir Singh, who had a large, well-organized *gher* and garden showed us his operation. We encountered him in the fields on February 8, where he had hired a tractor to prepare a 2-bigha field for onions. The tractor was rigged in the usual way with two rows of disk harrows and a wooden plank behind them. He showed us how the onion seedlings would be planted, four fingers between the furrows and four fingers between the seedlings. After planting, the field would be fertilized and watered.

Tomatoes had been in the field before it was plowed for onions, and the plants were piled high on the sides of the field. He planned to use them as fuel for cooking. At this point in the tomato season, some fields were finished while others were still yielding bountifully. We assumed that the good fields were those not affected by the *sundi* worms. Farmers can alter their cropping patterns to adjust for fluctuations in yield. Mahabir Singh may have decided that his tomatoes were not doing too well and that onions would be more profitable. Moreover, the onions would ripen in time for him to plant a kharif crop or else he could let the field lie fallow for wheat in the fall.

Five villagers briefly discussed the yield of onions and the money that could be made by growing them. One man said that an onion crop really could not be predicted; the yield was too variable. This comment concisely summarizes our data. The yield was reported to range from 100 to 240 maunds per acre. Prices were also said to vary widely, from Rs. 24 to Rs. 72 per maund. In any case, onions appeared to be a lucrative crop in a good year, and 1978 was a good year. The son of one of the biggest landowners in the village said that his father was growing onions—2.5 acres—for the first time because of the price. He emphasized the point by noting that one of the more conservative farmers had also planted some onions. Onions fitted well into the winter crop rotation. If the yield of tomatoes was below normal, there was still time to grow a crop of onions.

Mahabir Singh led us back to his cattle area (*gher*) and showed us his 14 onion seedbeds (*kyari*), each about 3 by 6 feet, separated by low ridges. The onions had been planted two months previously and would be transplanted to the fields in three or four days (fig. 28). The process would take about seven days, which suggested that he planned to use family labor. Hired laborers would not take so long. The onions



FIG. 28. Brahman farmer and family transplanting onions. His hookah is at right.

would be harvested in June. Onions were harvested all at once rather than over a period of several months, like tomatoes.

There was a variety of fruit trees in Mahabir Singh's *gher*: several papaya trees bearing considerable fruit, a pear or guava (*amrud*) tree, a plum (*ber*) tree, and a nim tree that was grown chiefly for its shade. The tree yielded a little firewood because the branches had to be cut back to improve the shade. In a corner of the *gher* was a pile of branches and some daincha for fuel. There was a shed on the property with a fodder cutter inside and a pile of black peas beside it. The peas would be shredded for fodder. He showed us various vegetables that he had grown for home consumption: spinach, carrots, and peppers, although the last may have been grown in a field and not in the cattle area. He dried the peppers and ground them up in a stone mortar.

Mahabir Singh grew tobacco in his *gher* for use in his own hookah. He had planted a tobacco seedbed next to the onion seedbeds. After the onions had been transplanted to the field, he would transplant the tobacco into the vacated area. The tobacco would be ripe in June. He showed us some dried tobacco from the previous year. He ground the tobacco in a stone mortar, the same one used for peppers, strained it through a sieve, and mixed it with gur.

About two weeks later, we returned to Mahabir Singh's *gher* to watch him transplant tobacco. In preparation, his son had dug a small irrigation ditch from a handpump to the beds where the tobacco would be transplanted. Mahabir Singh simply pulled the plants from the ground. When he had a handful, he began to transplant them. He dug a little hole about 1 inch deep with a trowel and inserted the plants. The holes were about 9 inches apart. He finished planting one bed and then his son

began to use the handpump. Water flowed along the little ditch and into the bed. When the tobacco was about 2 feet high, the leaves would begin to spread.

Several farmers grew tobacco, usually small amounts for their own use. We took no survey, but just in the course of daily observation we ran across five farmers in addition to Mahabir Singh who grew it. Tobacco cultivation was a recent innovation. Three farmers told us that they had been growing it for only a few years. It was a crop grown in *ghers* or perhaps on small plots inside the habitation site. Some farmers grew a few rows of tobacco in a field, in which case the tobacco was transplanted from a seedbed in the farmer's *gher*. Even when grown in a *gher* the tobacco was started in a seedbed and then transplanted, as in the case of Mahabir Singh above.

On February 10, we passed the *gher* of a Brahman farmer while he was transplanting tobacco into a small bed that had been soaked with water. We stopped to talk to him and to take some pictures (fig. 29). He simply pushed the plants into the ground with his fingers. There were 10 or so plots of varying sizes full of tobacco, in general about 2 or 3 feet by 10 feet. The tobacco would be ripe in Jeth (May–June). He grew it for his own use and would sell any surplus, probably in the village. He had been growing tobacco for only two or three years. After picking the tobacco, he covered it with tree leaves for two or three days so that it would sweat. He then dried it in the sun, ground it up, and added molasses (*rāla*), a byproduct of raw white sugar (*khand*) production (S. Freed and R. Freed, 1978: 42). Gur and *khand* were no longer produced in the village, so he bought molasses in a bazaar.

Much later in the tobacco season, at the end of March, we encountered a Brahman farmer in the fields weeding two small plots of tobacco with a trowel. He would



FIG. 29. Brahman farmer transplanting tobacco.

weed the tobacco two or three more times. In fact, he was just loosening the soil; there were few weeds. There were several varieties of tobacco. He was growing *kilkati*; he considered *kampla* to be the best. The current year was only the second time that he had grown tobacco. He talked a little about the economics of tobacco cultivation. Growing tobacco was a fair amount of work. It was transplanted and had to be weeded three or four times. But growing one's own tobacco made sense. Tobacco was expensive, selling for Rs. 5 per kilogram. However, no farmer had as yet been tempted to grow the plant commercially, probably because of the tax on commercial tobacco. He said that there was no tax on a 1-acre field of tobacco, but the Government taxed a field of 1 ha.

In addition to fruit, basketry material, twigs used for toothbrushes, and wood for carpentry, trees were a source of fuel for cooking. In 1958, fuel was generally not a problem, although with fuel, as with almost all resources, there was variation among families. Some families were well supplied; others were in need. But on the whole, cattle dung for cooking was in ample supply. It was formed into dungcakes which, when dry, were a basic fuel. Also, there were many trees both in the fields and in the village that yielded firewood.

The Green Revolution and land consolidation had altered the fuel regime considerably by 1978. The supply of cattle dung had not kept pace with the population increase, mainly because tractors had replaced bullocks. Most of the trees in the fields had been cut down, so much less firewood was available than formerly (fig. 30). The shortage of dungcakes and firewood was partially remedied by the cultivation of daincha, a plant used only for fuel. Also, some families bought coal for cooking. Fortunately, the climate was such that there was no need for fuel for space heating, although a few people heated bath water during the coldest months.

We continued to see a fair amount of firewood. Part of it came from trimming the trees left standing, but there was also wood remaining from the trees that had been cut at the time of land consolidation in 1974. Some families still had quite a bit of it.

In mid-November, we watched a young man and a woman chopping wood on the family plot used to make dungcakes. The man was using a large heavy ax, a hatchet, and four wedges. The ax had a metal handle. They obtained it from a family member in military service who was stationed on a border area where no one was allowed to have weapons. A man came along with this ax. The man from Shanti Nagar confiscated it and brought it back to the village.

Cutting wood struck us as very dangerous work. Once the ax head flew off. No one was hurt, but flying ax heads could be lethal. The man and woman treated the event calmly, remarking that the preceding day they had lent the ax and the borrower had damaged it. They also decided that the ax head had not been properly attached to the handle. The wedges were used to split logs lengthwise. A cut was made with the ax and then enlarged with wedges. The woman sometimes held the wedges while the man swung the ax, driving the wedges into the log with the blunt end of the ax head. When splitting a log, he supported it with his foot and swung the ax in the general direction of his foot. He worked in rubber sandals that left the toes and most of his foot exposed. One slip and he would be seriously hurt. Most young men wore such



FIG. 30. Jat housewife cooking bread with twigs and a small piece of wood, 1978. Though wood was in short supply at the time, firewood could still be obtained by trimming the trees that remained after land consolidation.

sandals while working in the fields. In our opinion, they gave insufficient support and protection to the feet. However the young man seemed quite used to them. While working, a blister on the palm of his hand broke. He looked at it a moment and then continued to work.

The woodcutters were working on a kikar log that had come from their fields at land consolidation. They had to surrender some old fields but received others in compensation. Before giving up their old fields, they cut down the trees and moved them to the area where they made dungcakes. The trees had been there since consolidation and were quite dry. There are two kinds of kikar trees—*kabli* (or *kabuli*) kikar, used only for firewood, and *desi kikar*, used in carpentry (see also Maheshwari, 1976: 145–146, 148–149). Twigs from *desi kikar* were chewed and used for toothbrushes, but not those from *kabli* kikar. Charcoal can be made from kikar wood. It catches fire easily and burns well. The log that they were cutting, about 7 feet long, would be used for firewood. It would provide enough wood for two days. The family, which was large, consumed about 20 kg of firewood per day.

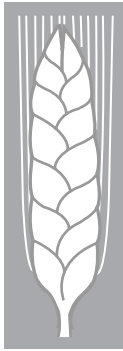
Children, who were members of the family, were standing around watching the work. As each one left to go home, he or she was given a piece of wood to carry. Someone came at about 3:30 p.m. and urged the woman to return home to start cooking the evening meal. In a large family, cooking for the evening meal began in mid-afternoon. Bread, the basic food, was cooked one piece at a time, and it took quite a

while to cook enough to feed a large family. Cooking time could be reduced by using more than one stove simultaneously.

We watched the work for about 40 minutes. The woodcutters were still working when we left, and they had been working before we arrived. Once again we were struck by how much work was required to provide necessities that in other countries were available almost without effort. In the West, one cooks with electricity or gas that is available at the turn of a knob. The societies that provide such miracles are technologically complicated but from the individual point of view, obtaining energy is simple. In rural Delhi when we were there, the situation was reversed—technology was simple but for the individual, simple matters, such as cooking fuel, were complicated.

Healthy trees in the habitation site were important for their shade, and so their owners did not cut them down. They did, however, trim them for firewood. We once watched two Potters trimming a kikar tree. They climbed the tree and cut off branches with a sort of pruning hook. One of the men was crippled, and yet he was remarkably adept at climbing the tree. Once again, we were impressed with the danger of some of the routine village work. The men were working high enough so that a fall would have been serious if not fatal, but they used no safety belts or any equipment other than the pruning hook.

Toward the end of February, we noticed that three or four families were burning coal in crude portable stoves (*angithi*) in courtyards or in the street. Nothing was being cooked, but the coal was on fire. We finally asked a farmer about his *angithi* where coal was burning, and he said that the coal was being prepared for cooking fuel. First it was burned for a while; when it stopped smoking, it could be used for cooking. He explained that his dungcakes from the preceding year were used up and that the new ones were still wet. He did not have enough firewood because of the trees that were cut down in land consolidation. Therefore, he had to buy soft coal, which cost Rs. 10.30 per maund. He said that the price was controlled.



CHAPTER FOUR

AGRICULTURE, RABI SEASON

WHEAT

THE ENTIRE PANOPLY of the Green Revolution is on display in wheat farming. The new high-yielding varieties of wheat are widely grown. Wheat farming is almost entirely mechanized. Tractors have replaced bullocks, changing the cattle composition, modifying the fuel regime, and altering the cropping pattern. Combines are available for reaping, but most farmers did not use them in 1978, chiefly because two government combines were temporarily out of order and unavailable. Threshing machines have replaced the trampling of bullock hooves and the winnowing basket. Tubewell irrigation and factory (*farmi*) fertilizers are generally used. Work is done rapidly and in relative comfort. Because of electricity, wheat can be threshed and cleaned in the evenings and at night under artificial lighting, thus avoiding the daytime heat of April. Wheat cultivation in Shanti Nagar offers a close detailed look at perhaps the most important post-World War II agricultural development in North India—and in the world.

Swaminathan writes:

New technologies supported by appropriate services and public policies have . . . led to the Green Revolution in agricultural production becoming one of the most socially significant of the scientific developments of this century. Four thousand years of wheat cultivation resulted in Indian farmers producing 6 million metric tons of wheat in 1947. Production in 1999 was 72 million tons, making India the second largest producer of wheat in the world. The average yield of wheat per hectare increased from 900 kilograms in 1964 to 2300 kilograms now. At the 1964 yield level, nearly 72 million hectares would be needed to produce India's current quantity of wheat, in contrast to the 24 million hectares now used for this crop. [Swaminathan, 2000: 425]

An ecological advantage of the Green Revolution in wheat is that production can be limited to the more favorable areas; it is not necessary to bring additional, perhaps marginal land into cultivation so that India may feed herself. Easterbrook (1997: 78) comments, "In the past five years [1992–1997], India has been able to slow and perhaps even halt its national deforestation, a hopeful sign." (See also Rao, 1998: 1947.)

The “appropriate services and public policies” that Swaminathan mentions above deserve attention here. There were two components to the Green Revolution: on the one hand, science, on the other hand, national economic and social policy. Science was in the hands of Norman Borlaug and his team who developed high-yielding dwarf varieties of wheat in Mexico: hence they were known as Mexican, or dwarf, wheat. This dwarf wheat was the basis of the Green Revolution in India and Pakistan.

Political and economic strategy was the domain of the late Chidambaram Subramaniam, rightly called the father of the Green Revolution in India. In his obituary in *The New York Times*, Dugger (2000: B11) wrote, “[He] talked Prime Minister [Lal Bahadur] Shastri into supporting a major new program to sell the hybrid seeds, fertilizers, and pesticides at heavily subsidized prices.” In effect, he created the entire subsidy system for farmers.

In its obituary, *India Abroad* wrote:

Among all the things that C. Subramaniam will be remembered for, foremost is the “Green Revolution”—the transformation he effected in Indian agriculture through sheer political will. . . . He began a remunerative price policy for farmers and set up the Agricultural Prices Commission and the Food Corporation of India in 1965. Subramaniam then reorganized agricultural research and freed it from the clutches of the bureaucracy. In 1966, he resorted to large-scale import of high-yielding wheat seeds, despite opposition from the Left parties and bureaucrats. He masterfully steered through political hurdles and bureaucratic red tape. . . . [India] harvested 17 million tons of wheat in 1967–1968, five million more than the previous best. . . . That marked the beginning of the Green Revolution. Subramaniam always said that neither he nor the scientists who later indigenized the high-yielding seeds were the makers of the revolution. He maintained that the real heroes of the revolution were the farmers of Punjab [and, we might add, adjacent regions, especially Haryana and the Union Territory of Delhi, once part of Punjab]. [*India Abroad*, 2000, Nov. 17: 42]

In his address when being awarded the Nobel Peace Prize in 1970, Borlaug spoke in glowing terms of the “indigenization” of wheat research:

The All-India Coordinated Wheat Improvement Program, which is largely responsible for the wheat revolution in India, has developed one of the most extensive and widely diversified wheat research programs in the world. Its success has generated confidence, a sense of purpose and determination. The current agronomic research on wheat in India equals the best in the world. The breeding program is huge, diversified and aggressive; already it has produced several varieties which surpass those originally introduced from Mexico in 1965. [Borlaug, 2001: 13–14]

Wheat dominates agriculture in Shanti Nagar. It was by far the most extensively grown of all crops in both the rabi and kharif seasons. In the 1958 rabi season, 823 irrigated and 518 *barani* (rainfed) bighas were sown in wheat, a total of 1341 bighas. Gram (chick pea), the second most widely cultivated of the rabi crops, was grown on

656 *barani* bighas and merely 3 irrigated bighas, a total of 659 bighas, or 49% of the land devoted to wheat. Jowar, the most widely grown kharif crop of the day, covered 628 bighas, only 47% of the area devoted to wheat. Sugarcane, the most lucrative of the kharif crops, was grown on just 374 irrigated bighas, its cultivation probably restricted by the limited irrigated acreage then available and the labor-intensive nature of the crop.

Wheat greatly increased its acreage during the years of the Green Revolution. From 1970 to 1977, an average of 2744 bighas were sown in wheat, more than double the 1341 bighas of 1958. In 1977, according to the village crop chart, wheat covered 3560 irrigated bighas. None was sown on unirrigated land. Desi (indigenous) wheat can be grown on *barani* land, but some of it is lost. In 1958, 39% of the wheat was sown on *barani* land and 19% of it failed to mature. The new varieties do not do well on *barani* land because of their irrigation requirements, and the *barani* acreage devoted to wheat in the 1970s was far less than the 39% of 1958. It averaged only about 7% of the mean wheat acreage. Most of this rainfed acreage probably represented desi wheat still being grown, which amounted to 10% of the wheat crop according to one local farmer. The Block Development Officer also mentioned 10%. This figure has to be accepted on faith, for the village crop chart does not partition the wheat crop by variety.

The increase in wheat acreage was clearly the result of the Green Revolution. The high-yielding varieties of wheat were introduced into India in 1967–1968 and their effects in Shanti Nagar were clear by 1970 (Delhi Administration, 1976: 230). The yield of the new varieties—double that of improved desi wheat—could not be ignored. Tube-wells for supplying the necessary irrigation, tractors, mechanical threshers, factory fertilizers, and combines all appeared on the scene. The increase of wheat acreage took place chiefly at the expense of gram. The mean acreage planted in gram from 1970 to 1977 was 66 bighas as compared to the 1958 planting of 659 bighas. Although an important food, gram has lost favor because there is no high-yielding variety, and the extension of irrigation has reduced the *barani* area, which is particularly suitable for its cultivation. The Village Level Worker told us that a new gram seed had been developed in Uttar Pradesh, but local farmers would not risk using it because it had been developed in another region and might not do well in the local soil. The domination of wheat was overwhelming in the rabi season of 1977: 3560 bighas in wheat; only 266 bighas in all other crops, if the crop chart is to be taken at face value.

Bajra, the major kharif cereal grown in Shanti Nagar, has also benefited greatly from the high-yielding varieties of the Green Revolution. Hybrid bajra arrived around 1970. In 1958, farmers reported that an acre of bajra yielded about 8.5 maunds of grain; in 1978, they reported a yield of 20 to 25 maunds per acre, or about 2.5 to 3 times the yield of the 1950s. The Delhi Gazetteer reports similar figures for the Union Territory, "The yield of [hybrid bajra] is comparatively 2 to 3 times more than that of the *Desi* variety grown earlier. The earheads of Hybrid varieties of bajra are longer and compact in size having bolder grains" (Delhi Administration, 1976: 238).

As was true of wheat, the acreage devoted to bajra increased considerably after the introduction of the improved varieties. From 1969 to 1972, according to the village crop chart, an average of only 76 bighas was in bajra. From 1973 to 1977, the

average acreage jumped to about 390 bighas. We assume that the sudden rise from 1972 to 1973—56 bighas to 429 bighas—was due to the acceptance of the hybrid seeds. However, a qualification is in order. In 1958, 588 bighas were in bajra, and so there may have been a long-term reduction in its area. We do not have the figures from 1958 to 1969, which would be helpful for analyzing the history of the cultivation of bajra before and after the new seeds. However, the acreage of many crops varies considerably from year to year. For example, in 1976, the village crop chart reports 346 bighas in bajra; the following year the figure had dropped to 49. Because during the preceding four years (1973–1976) the smallest acreage was 338 bighas, we are somewhat suspicious of the very low figure from 1977. Nevertheless, if there was a declining trend in bajra acreage after 1958, the Green Revolution reversed it.

Paddy, however, has not increased its acreage in Shanti Nagar—as have wheat and bajra—although high-yielding varieties are available. In this regard, Shanti Nagar differed from the whole of Delhi Union Territory. Paddy acreage in the Union Territory shot up from 195 ha in 1950–1951 to 3100 ha in 1968–1969 (Delhi Administration, 1976: 234). But in Shanti Nagar, paddy acreage hardly budged: 99 bighas in 1958; an average of 95 bighas from 1969 to 1977. The decision of farmers not to increase the acreage of paddy may have been due to several reasons. Paddy ripens late, and although the new varieties of wheat can follow paddy, apparently most farmers prefer to precede wheat with bajra, jowar, a vegetable, or fallow. Food preferences must be taken into account. The basic food in Shanti Nagar is bread. Wheat is the preferred grain for bread but bajra also makes good bread. Rice does not make bread. We think it is also possible, although none of our informants raised this point, that paddy, as a cash crop, was in competition with sugarcane in the 1950s and with tomatoes after they replaced sugarcane. Shanti Nagar is conveniently located for selling tomatoes in the Delhi vegetable market. The increase in paddy acreage noted for the Union Territory may have largely taken place in villages not so suitable for truck farming.

Although each of the chief food grains grown in Shanti Nagar—wheat, bajra, and rice—benefited from the Green Revolution, wheat profited the most, as shown by its increased acreage. From all points of view, wheat is the ideal grain for the Green Revolution. It is not too much of an exaggeration to say that the Green Revolution in Shanti Nagar has been essentially a wheat revolution.

The high-yielding varieties themselves are not the reason that one speaks of a revolution. In the 1950s, the Government was steadily introducing improved varieties of desi wheat with increasingly greater yields. The high-yielding varieties are the latest step in an established developmental sequence. To appreciate why the Green Revolution is properly termed a revolution, one has to compare the technology of equivalent stages of wheat cultivation typical of the 1950s with those of the 1970s, a comparison still possible in 1978. When one stands in the fields and watches a bullock-drawn wooden plow made by a village artisan plowing in one field compared to a tractor with its factory-made disc harrow plowing in another, the nature of the revolution is clear. Wheat production has moved from the peasant level based on bullock power to a modern commercial operation using factory products and powered by electricity and the internal combustion engine. Nonetheless, while the desi seeds and the old peasant technology play a reduced role, they are still on the scene,

and villagers will sometimes debate the relative merits of the old and the new, just as they debated the advantages of sugarcane versus tomatoes.

WHEAT, 1958, FROM PLOWING TO HARVEST

Wheat cultivation was harder work in the 1950s than in the 1970s because of the preindustrial technology then in use, which meant that each operation—plowing, sowing, threshing, and so on—took longer and required more effort. A field was plowed a minimum of eight times before sowing wheat. An industrious farmer might plow a field as many as 20 times. Then either a plank of wood (*mej*) or a stone roller (*koleri*) was drawn over the field by bullocks to crush the clods of earth turned up by the plow. Farmers began plowing in preparation for sowing wheat after mid-August when the monsoon rains had diminished and the soil had become firm enough to be plowed (figs. 31, 32). Plowing continued until the end of October. It was followed by sowing which lasted into early November. During these months, farmers, their families, and their bullocks worked harder than in any other period of the year. Not only were fields plowed for wheat and other rabi crops, but rice and tomatoes were weeded,



FIG. 31. Bullocks plowing a field of a prosperous Jat farmer for wheat.



FIG. 32. The only camel in the village in 1958 plowing the field of a Jat farmer for wheat. The camel performed most of the functions of bullocks, such as plowing and turning sugarcane crushers and Persian wheels. Villagers said that a camel was as strong as one-and-a-half bullocks. Whereas two bullocks were needed to plow, one camel was enough. A blindfolded camel would continue to turn a sugarcane crusher without being driven, but a team of bullocks had to be urged on. Villagers regarded some of the habits of camels as rather despicable, such as spitting. There was no camel in the village in 1978.

sugarcane plants were tied together, and kharif crops were harvested. One farmer told us that at this season people wished that they and their bullocks were made of steel so that they could work constantly. By the middle of November, these activities were completed; sprouts of the new wheat made their appearance in the fields.

Plowing with a wooden plow and bullocks requires strength and skill. We saw only adult men plowing. A Brahman, reputed to be one of the best plowmen in the village, said, "I was 18 or 19 when I first started to plow. There is no fixed age. It depends on how many adult men are in the family. My uncle taught me. It took me about 15 days to learn. But to become really good takes a year." He emphasized sowing—which is done with a metal, or bamboo, tube (*orna*) attached to a plow—as needing considerable experience. The trick apparently is to sow the seeds at a precise depth, neither too deep nor too shallow. "This takes time to learn." The most demanding operation is the cultivation of sugarcane, maneuvering the plow around the sugarcane plants to loosen the soil and turn up weeds (fig. 10). The plowman controls his bullocks with a whip and a system of verbal signals. We recorded the signals as follows: to start the bullocks moving, the plowman clicked his tongue; he made a hissing sound to stop them; "Burr" was a signal to the lefthand bullock; "a-ha-ha" was the signal to the righthand bullock; "hat" turned the bullocks.

We saw more plowing in 1958 than in 1977 because it took much longer to prepare fields for wheat with bullocks than with tractors. During the busy season from August to November, the village residential area was often largely empty as most able-bodied people were in the fields. We first became aware of how much plowing was taking place on August 21. We took a two-hour morning walk in the fields and were struck by the great amount of activity, mainly plowing for wheat. The next day, one plowman told us that he had been plowing from 4:00 a.m. to 2:00 p.m. It is very hot in August, and people try to avoid heavy work in the afternoon sun.

The land had been lying fallow for some time and was covered with grass. Many cattle were grazing. Anyone can graze cattle in an empty field. The landowner does not have exclusive grazing rights when his field is empty but, on the other hand, he benefits from any dung that falls on his field. We also watched two men who were moving soil in a field to level it. They were using a wooden tray with iron fittings dragged by bullocks. The tray is loaded with soil and dragged to a new location where a man grasps the handle and dumps the soil (fig. 33).

A month later, plowing was still at its height. During our walk, we saw nothing but men plowing and women gathering fodder. Fodder was in short supply in 1958, and women spent an inordinate time—it seemed to us—in the fields gathering grass and edible weeds for their livestock (fig. 34). Fodder was not a problem in 1978, probably for many reasons. The high-yielding varieties of jowar and bajra produced more fodder than in the 1950s, less acreage ended in waste than formerly, the acreage



FIG. 33. Moving earth to level a field. Bullocks drag a tray (*gorhi*) made of thick wood, iron fittings and a metal blade.

devoted to clover (berseem), a fodder crop, had increased, and the cattle population had grown only slightly, 390 water buffalo and zebu cattle in 1958, against 427 in 1978, an increase of only 9.5% (table 5).

In the course of this walk, we ran into the same two Jats who were leveling a field a month earlier. This time they were plowing, but had to change plows. They had a new one which was not quite right for plowing hard land. They would use it on softer fields until it had been worn into proper shape. It never occurred to us that wooden plows had to be broken in, just as do shoes. Another trick of the plowman's trade was to soak a plow when the parts became loose. Several months earlier during the spring plowing season, we were startled one day when a Brahman farmer hustled by us to throw his plow into a pond beside which we were standing. He explained that the wood would absorb water and tighten the plow. A Jat plowman, stopped a moment to talk to us. He said that he could plow from 4 to 6 bighas a day with his bullocks. Another Jat who at the time owned the only tractor in the village said that he could plow all his land—150 bighas—in three days.



FIG. 34. Women carrying headloads of grass wrapped in large cloths back from the fields to be used as fodder. This seemingly simple act requires great dexterity, coordination, and balance, not to mention considerable strength. The grass is somewhat loose and shifts slightly according to the motion of the bearer. Moreover, the path is not level, yet a woman has to maintain her position directly under the bundle. We have tried this and managed perhaps a dozen steps before the bundle tipped to one side and fell to the ground.

TABLE 5.

CATTLE IN SHANTI NAGAR BY DATE OF STUDY

	1958–1959		1977–1978	
	NUMBER	AVERAGE PER PERSON	NUMBER	AVERAGE PER PERSON ^a
All cattle	390	0.49	427	0.32
Zebu cattle	200	0.25	117	0.09
Bullocks	95	0.12	12	0.01
Cows	47	0.06	47	0.04
Calves	58	0.07	58	0.04
Male	—	—	29	0.02
Female	—	—	29	0.02
Water buffalo	190	0.24	310	0.23
Cows	111	0.14	190	0.14
Calves	79	0.10	120	0.09
Male	—	—	40	0.03
Female	—	—	80	0.06

^aThe village population was 799 in 1958–1959 and 1324 in 1977–1978.

In the 1950s, four varieties of wheat were grown, all of them new varieties introduced by the Government. The most popular was known as C281. It had replaced the earlier indigenous variety chiefly because it fetched a higher sale price and also because it lacked two disadvantages of the previous desi variety. Men acquired blisters during the threshing of the previous variety; and it also irritated the hooves of bullocks as they walked over it to thresh it. On the other hand, the earlier variety was said to have a better flavor and to cause less depletion of the soil. It did not appear likely that C281 would continue to be the dominant wheat in Shanti Nagar for any great length of time. Farmers were already becoming interested in C591, which was reputed to produce superior fodder—the animals liked it more than the fodder of other varieties—and to be more golden in color than C281, so that it sold at a higher price. Moreover, that year the Government was recommending wheat NP718, and the Village Level Worker had just arranged for a demonstration plot of wheat 874, yet another new variety. And in addition to this constant development of improved desi wheat, the high-yielding varieties were just over the horizon. They soon dominated wheat cultivation. Each new variety was accepted because of superior yield and price, the dominant considerations in choosing among the varieties of any crop that was sent to market. On the other hand, farmers who grew wheat for home consumption often grew desi wheat because of its better taste.

In the late 1950s, the Village Level Worker, a governmental employee, was an important intermediary between the Government and the village (S. Freed and R. Freed, 1976: 189–192). The Government used him as a conduit for bringing new ideas and materiel to the attention of villagers, especially important villagers. He was sent to his assigned villages to become familiar with their inhabitants, to provide

technical information, and also to publicize governmental programs. Although he walked through the village talking to many farmers—trying to persuade them with verbal arguments—his most effective strategy was the demonstration plot. A key player in this strategy was the educated progressive farmer.

In late October, the Village Level Worker paid us a visit. He said:

I was sent to the village today to lay out a demonstration plot for a new variety of wheat (874). It was just developed at Pusa Institute and has a greater yield than other varieties. I'll sow it in Mahinder Singh's field. He is very receptive to new ideas because he is educated and works at the Pusa Institute. Educated farmers who are not living from hand to mouth are most receptive to new ideas. Rameshwar and Dayanand [Jat farmers with large landholdings] are resistant. They say that they are old and have grey hair and have been farming all their lives, so what can I tell them.

In the 1950s, farmers did not usually fertilize wheat fields with dung, the only fertilizer then commonly in use. Dung was used as fuel for cooking, and the average farmer may have had little to spare for fertilizer. However, factory fertilizers were available, and the Government strongly encouraged farmers to use them. In late September, the Development Block people sent 20-man rabi teams into the villages trying to convince farmers to use factory fertilizer. Asked what they accomplished, a young intelligent Jat farmer, progressive but often hostile to governmental programs, said, "They did nothing but gossip, smoke, drink tea, and urge farmers to buy expensive fertilizer. How can we buy fertilizer when we have no fodder for our animals." The next day, we asked another Jat farmer about the rabi teams, and he was more understanding. He said, "The Community Development people are not in a very good position to help the farmers, but we get considerable help from the Agriculture Department." We are not sure, but he may have had Pusa Institute in mind. On the way back from the fields, we stopped at a Jat's house. He complained about the carcasses of animals being dumped near the village. The place was swarming with vultures.

As an aside, we noticed far fewer vultures in 1978 than in 1958. In fact, we cannot recall any vultures at all roosting in trees waiting to devour dead cattle, a common sight in 1958. The ecology of dead cattle had changed in 20 years. In the 1950s, the hide and bones of dead cattle were scavenged and sold by Leatherworkers, who were given the carcasses of cattle in payment for removing them. The Leatherworkers, partly for reasons of caste prestige, abandoned the scavenging of dead cattle, considered a demeaning occupation. In the 1970s, unflayed dead cattle were buried by their owners. We assumed that the decline in the vulture population was due to this social and economic change and thought no more about the matter. There is apparently more to it than that. Holden reports:

Rotting, stinking cattle carcasses seem to be strewn all over northern India—the result of a mysterious and catastrophic die-off of vultures. The situation has gotten so bad that the government is setting up carcass disposal plants. . . . India's vulture population crash actually began a decade ago. The results are now particularly evident in the north, around Delhi. . . .

[T]his may be the biggest die-off ever to hit these hardy birds anywhere. . . .
[A]n infectious disease appears to be the culprit. [Holden, 2000: 1679]

The population crash began around 1990, but there might have been forerunners a decade earlier. How the other two principal scavengers of dead cattle—dogs, and the black kite (*Milvus migrans*)—fit into the equation is not known and merits study.

The Village Level Worker offered a realistic appraisal of the fertilizer situation. He said:

My department is not concentrating too much on dung as a fertilizer since there is a shortage of fuel here and much dung is burned [for cooking]. We put most of our efforts on superphosphate, ammonium sulphate, and urea. We are trying to get the farmers to use superphosphate. It will increase wheat yield a minimum of 1 maund per bigha or 5 maunds per acre. An acre requires 50 kg, which cost Rs. 16, but the Government will give a subsidy of Rs. 8, so the actual cost is only Rs. 8.

If these figures were anywhere near correct, superphosphate would have been very profitable. Five more maunds of wheat per acre translated into 80 more rupees of income at a cost of only Rs. 8. Yet there was no stampede for superphosphate. Twenty years later, it was widely used for the new high-yielding varieties.

There was another way to fertilize fields, which farmers believed to be the most effective of all their known methods of fertilization. It consisted of transporting soil from one field to another. A Jat farmer, who kept a detailed record of expenses, which he allowed us to copy, used this method to fertilize 2.5 acres for wheat. He paid Rs. 139 to Gola Potters, one of whose traditional caste occupations was to transport loads on the backs of donkeys and mules, to move soil from one field to another. Fertilizing 2.5 acres with superphosphate would have cost him only Rs. 20, a seemingly much more economical method. Farmers were clearly wary of factory fertilizers in the late 1950s.

In addition to fertilizing fields by moving soil, another reason that farmers could largely ignore factory fertilizer was the crop rotation. Fields destined for wheat almost always lay fallow during the preceding kharif season, a practice that strengthened a field. The Village Level Worker also had the crop rotation in mind. He said that farmers should sow gram after bajra and jowar, the chief kharif grains. Then the fields should lie fallow before wheat was sown in the next rabi season. On this point, the farmers did not really need his advice. Their usual crop rotation approximated his recommendation. For example, a Nai Barber, one of whose patrons was a big Brahman landowner, was allowed to cultivate one of the Brahman's fields in return for some agricultural work. The Barber explained his crop rotation for the rabi season. He said:

My field is 1.5 bighas. My patron plows it for me and I furnish the seed. I had jowar and bajra in this field during the kharif season. Now, I have planted peas, barley, and gram, which will give me cattle fodder for 20 or 30 days. For the rest of the year, I depend on headloads of fodder that I get from my patrons.²⁹ After this rabi season, I will let the field lie fallow during the next kharif season and then work the land over very well for wheat.

The Village Level Worker also claimed that he was trying to persuade farmers to grow wheat and gram together, a mixture known as *gochni*, because it increased the wheat yield. The farmers needed little encouragement, for *gochni* was already the third most important rabi crop both in acreage and in value, after wheat and gram sown alone. It was grown on 28 irrigated bighas and 210 *barani* bighas, all of which matured. The area sown in wheat, gram, and their mixture, *gochni*, was 2237 bighas, which amounted to 86% of the total area sown during the rabi season of 1958. The three major crops of the kharif season, sugarcane, jowar, and bajra, occupied 85% of the area sown during that season. For *gochni*, 8 seers of seed per bigha were required in a ratio of three parts wheat and one part of gram. This ratio was maintained in the harvested crop.

Growing wheat and gram in the same field was believed to have advantages: The presence of gram augmented the yield of wheat; it was feasible to sow the mixture in a field that had contained either jowar or bajra in the preceding kharif season; also, the fact that gram grew close to the ground and wheat grew over it resulted in a “double crop”, as one informant described it. The average yield was approximately 2 maunds and 3 to 4 maunds of chaff per bigha. Most *gochni* was consumed in the village. It was said that city people did not like it.

From our figures, we cannot tell if the *gochni* mixture increased the yield of wheat, as claimed. A Jat farmer pointed out that yield depends on the quality of land. Most *gochni* was sown on *barani* land and most wheat, on irrigated land. Moreover,



FIG. 35. Brahman farmer sowing a mixture (*gochni*) of wheat and chickpeas through a metal tube attached to a wooden plow, 1958. We tried for an action shot, but the farmer politely stopped to pose for the photo.



FIG. 36. Jhinvar Watercarrier plowman sowing wheat through a metal tube for a landowner, 1977. The seed is carried in a bag over his shoulder. This man was one of the few who still owned bullocks. His services were much in demand, and he apparently did very well to judge from the bullocks. Compare the well-fed bullocks in this figure with the thin bullocks in figure 35.

less wheat seed was sown in a field using the *gochni* mixture than in a field of pure wheat. Farmers used 10 seers per bigha for wheat, 8 seers for *gochni*, and 4 seers for pure gram. The *gochni* seed mixture for a bigha included only 6 seers of wheat seed.

Therefore, fields used for *gochni* were probably not the best, *gochni* might be sown without a preceding fallow, and less wheat seed was used for a field of *gochni* than for an equal area of pure wheat. We cannot juggle all these variables, and so take the word of farmers and the Village Level Worker that the *gochni* mixture was good for wheat. A big advantage would be that none of the *gochni* ended in waste despite most of it having been sown on *barani* land. Moreover, it could be planted immediately after jowar and bajra.

Both wheat and *gochni* were sown through a funnel-shaped metal tube attached to a light plow with an iron share used especially for sowing. Carrying seed in a sack over his shoulder, the farmer dipped out handfuls as needed and fed the seed gradually into the tube (*orna*) (figs. 35, 36). Farmers without bullocks hired another farmer for sowing. The rate for sowing gram was Rs. 2 per bigha—the standard fee.

The wheat grown on irrigated land received water as needed, but not at the precise intervals that the improved varieties would require. Wheat could be grown—and

was grown—without irrigation on *barani* land, but in 1958, 19% of such wheat ended in waste. Less than 1% of the irrigated wheat failed to mature. Wheat was neither hoed nor weeded. The key to a good wheat harvest was frequent careful plowing. Dung manure certainly helped, if a farmer had any dung to spare.

It was imperative to guard wheat during the growing season to protect it from animals, birds, and people. Five Chuhra Sweeper served as guards. The landowners selected one man to be responsible; he, in turn, selected his associates. At the harvest, these watchmen received one sheaf of grain per bigha in addition to one-quarter seer of wheat per bigha at the beginning of the season, all of which they divided equally among themselves. At the end of the season, we visited one of the guards. He told us that, in payment for his six months of guard duty, he had received from 6 to 7 maunds of wheat at the harvest. Once a farmer called our attention to a pile of wheat sheaves left in the fields overnight before transportation to the threshing floor. He showed us that the sheaves were piled so that the surface of the stack was smooth. If a sheaf were stolen, the farmer would notice the resultant irregularity the moment he saw his stack, provided that the thief did not restack the sheaves in a pile with a smooth surface.

By early December, the wheat was high enough to be safe from birds. There was no longer any seed to eat. A farmer told us that when a seedling divides to produce two leaves it is safe from birds. We are unsure about the need for guards from then until the harvest in spring. Perhaps farmers wanted them to protect wheat fields from an occasional stray cow, which would hardly seem enough of a nuisance to justify their fee, but more likely they were needed to deter thieves, who could steal wheat by cutting off just the ears. If undisturbed, thieves could strip a field in a night.

The seasonal contract for field guards had been abandoned by 1978. A farmer explained that unattended grazing zebu cows were the chief reason for guarding the fields, and there were few cows in the village. We replied that a water buffalo could also get into a field. He laughed and said that a buffalo would be kept tied at home because buffalos gave milk. This explanation suffers from the fact that the number of cows in the village in 1978 was exactly the same as in 1958. Moreover, the danger posed by zebu cows had increased considerably over the years because of a herd of some 20 feral cows that rested on government land along a canal during the day and entered the fields at night to graze. We think that the system of seasonal guards was no longer either necessary or efficient for two reasons: land consolidation and the feral herd. If a farmer's fields were scattered, he could not keep an eye on all of them and would need extra help. After consolidation, family members could take care of guard duty. The family guards could use the family tubewell hut as shelter. Besides, tubewells themselves often had to be guarded. As for feral cattle, five scattered guards would be of little use against a feral herd. We shall have more to say about feral cattle below.

Wheat needed little attention after mid-December, and activity in the fields declined. The principal work during the winter of 1958 was the sugarcane harvest and the production of gur. However, this work was centered on the sugarcane crushers, which were close to the habitation site and not in the fields. The next spurt of activity in the fields would be the wheat harvest in the spring.



FIG. 37. Tractor rigged for plowing. A man sits on the wooden plank (*mei*) to increase its weight. The plank crushes and flattens the clumps of earth turned up by the plowing.

WHEAT, 1977–1978, FROM PLOWING TO HARVEST

In 1977, tractors rigged with disc harrows plowed most of the land. We saw only disc harrows in use, but we did see a plow, unused at the time. The typical outfit was a tractor, two rows of disc harrows and then a heavy plank (*mei*), often with someone squatting on it for additional weight (figs. 37, 38). The plowing season was shorter in 1977 than in 1958, from about mid-October to early or mid-November, because tractors did most of the plowing instead of bullocks. Sowing took place in November, especially in the last fortnight and was effectively finished by the end of the month, although it was possible to continue sowing until early December.

Fields were generally not plowed as many times in the 1970s as in the 1950s. A Jat farmer, one of our best informants, said “The earth should not have lumps of soil in it. It should be fine and even. I plow with a tractor that I have had for seven years. For wheat, I plow only 5 times as compared to 8 to 12 times in 1958 [when I used bullocks]. I use only the cultivator, harrow, and seeder. I don’t use a plow.” A second farmer also said that he plowed 5 or 6 times for wheat, but a third farmer said that he plowed 9 times. The first farmer added some details. He said, “An empty field [one that had lain fallow] is plowed 20 times. If a field is sandy, it needs to be plowed 4 or 5 times. Loam needs 10 plowings, and clay takes a lot of plowing as lumps of soil are formed [that have to be broken up].” Stubborn lumps of soil, grass, and stones were removed from the field. The character of a field and a farmer’s particular circumstances determine how often he plowed it. We think that 6 plowings would approximate the modal number. Rarely, a field might be plowed only 2 or 3 times before sowing. Perhaps the landowner was working under time pressure, or perhaps he had to economize. A farmer without a tractor had to pay Rs. 25 per acre for a single plowing.



FIG. 38. Jhinvar Watercarrier, the same man as shown in figure 36, smoothing a plowed field with a wooden plank (*mej*). Planks were used with bullocks as well as with tractors. The plowman had to balance himself while standing on the moving plank, which was not easy. We were once invited to try it. We struggled to maintain balance by pulling on the reins, and the bullocks stopped. Plowmen seem to balance themselves effortlessly. With a tractor, a farmer sits on the plank rather than standing, which is much easier to do.

On October 29, somewhat past the middle of the plowing season, we were in the fields at 7:00 a.m. There was no activity other than a man harvesting paddy. Many fields had been plowed for wheat. In some of them, piles of manure were regularly spaced, ready for spreading. To judge from what we remembered from 1958, the earth in many of the fields did not appear to be fine enough for wheat and perhaps farmers planned additional plowings. Two days later we were in the fields at 6:00 a.m. Except for a bullock team at work at very first light there was no activity. There were large areas where no crops could be seen, only empty fields prepared for wheat. An air of expectancy seemed to hover over the countryside as if some grand enterprise was about to be launched.

Three days later, November 3, we were in the fields at 6:00 a.m., 30 minutes before sunrise. Aside from a farmer plowing with a team of bullocks, there was no activity. The farmer had been working for a while, for a number of furrows had already been plowed. We probably saw plowing with bullocks as often as with tractors, but it does not follow that the two methods plowed an equal acreage. A team of bullocks might plow 1 or 2 acres per day while a tractor perhaps plowed 12. Besides, there were only 12 bullocks in the village but some 27 tractors, so most of the heavy field work was done by tractors. Aside from the conservatism of a few farmers who preferred to plow with bullocks, they were otherwise retained for special functions. They could do work that tractors could not. Bullocks planted rows of mustard seed

in wheat fields, dividing the field into equally spaced parallel lanes for the convenience of harvesters in the spring. One lane was assigned to one harvester, so there was no confusion at the end of the day about how much wheat each harvester had cut. Bullocks plowed fields that could not be reached by tractors. They were better than tractors for plowing the corners of fields. Tractors left a little unplowed land in the corners which some farmers ignored but others cultivated with hoes.

The last plowing we saw was on November 15. A young Jat was using his family's tractor, outfitted with two rows of disc harrows, to plow a field for a Leatherworker. He plowed the field twice, the second time at a right angle to the first plowing. This counted as two plowings, so the landowner would pay Rs. 50 for the service. The Chamar and his son were cutting back the raised path that separates fields, leaving only the minimum width upon which to walk. The shaving of paths by farmers with adjacent plots was standard practice. The Chamars were also digging in the corners of the field where the tractor could not reach. They removed the grass that was turned up in the process. Some men were standing there watching and, when questioned, explained that it was because canal water was released that day. They had to be present to repair earthen dikes (bunds) wherever the water broke through into fields not scheduled for irrigation. Unless the landowner repaired the breach, he would be billed for the undesired water.

Both desi wheat and the high-yielding varieties were sown in 1977. The desi seeds were 306, 591, 800, 890, and Ludhiana. The high-yielding varieties were 308, 1553, (*hira*) *moti*, also called 851, 2009, Punjab *Kalyan*, and many more as the farmers explained. There appeared to be no clear favorite among the desi seeds. The high-yielding variety mentioned most often was 1553, the favorite of the "big growers". A Brahman farmer pointed out what would appear to be an advantage of 1553. In discussing a field of tomatoes that was not developing well, he said that even if the crop was spoiled, there was still time to plant wheat, for 1553 could be sown until December 25, very late in the year we might add. However, the other high-yielding varieties had their advocates. We had a long chat with two Jat farmers about the new seeds. One farmer said that 1553 gave the best yield; the other opted for 2009, whereas his father sowed *hira moti* (diamond pearl). Both farmers said that the seed chosen depended on personal preference and different varieties of land. One of the farmers said that you have to compensate for the weakness of land by the use of fertilizer. The other man said that [rather than using fertilizer] it is better practice to rotate the varieties of seed.

Wheat seed cost Rs. 150 per quintal. About 40 to 50 kg of seed were used for 1 acre. If seed was sown late in the year, after December 1, then 50 kg were needed because fewer seeds germinated late in the season. The yield of wheat sown in early December was less than that of the wheat sown earlier.

On average, the new varieties yielded twice as much wheat as the desi seeds. However, yields could vary considerably from farmer to farmer. This is because yield depends not only on seed but also on the proper use of fertilizer, irrigation, the strength of a field, the attention paid to the crop and the expertise of the specific farmer. There may be a tendency to exaggerate yield when a farmer is arguing a point of view, for example, the claim that desi wheat would yield as much grain as the new varieties if given similar attention. Because desi wheat was taller than the new varieties, it

had a greater tendency to lodge in high winds than did dwarf wheat. We occasionally noticed patches of wheat that were lying flat. It was due to high wind, rain, and sometimes hail. We compared ears of desi and high-yielding wheat. The shorter variety had an ear that was longer and thicker than the desi variety. A farmer told us that desi grain was denser than the grain of high-yielding varieties. A given volume of desi wheat weighed more than a similar volume of high-yielding wheat.

We asked a Brahman farmer how farmers decided which variety of wheat to grow. He replied:

If a man's *kunba* [lineage, but in this context we think he meant family] is big and he also wants to have some wheat to sell, he grows a new variety. If his family is small and wheat is grown only for home consumption, a farmer may grow desi wheat. More people grow a high-yielding variety than desi wheat. Desi wheat sells for more. If a high-yielding variety sells for Rs. 125 per quintal, then desi wheat sells for Rs. 150. After the harvest the price of the new variety is between Rs. 125 and Rs. 150. The price may mount to Rs. 160. Desi wheat may sell for between Rs. 175 and Rs. 200. After the harvest the price mounts. A very good crop of the new variety is 48 maunds per acre [10 maunds per bigha]. If the crop is not so good, the yield will be from 30 to 35 maunds per acre [about 6.8 maunds per bigha]. The maximum yield for desi wheat is 25 maunds per acre [about 5 maunds per bigha]. But the yield may be only 10 or 15 maunds per acre [about 2.6 maunds per bigha]. This year [1978] is a good year.

These figures suggest that a farmer would be better off raising a high-yielding variety, selling all of it in the market, and buying desi wheat in the market for home consumption. The return for an acre of a high-yielding variety was about Rs. 2500 (Rs. 125 per quintal $\times$ 19.2 quintals). Desi wheat produced a return per acre of Rs. 1500 (Rs. 150 $\times$ 10 quintals). A farmer who needed 10 quintals of desi wheat for home consumption could purchase it rather than devote an acre to grow it. He would theoretically be ahead of the game by Rs. 1000. But there were probably good reasons for not adopting this strategy. A householder may have found it difficult to find the particular desired variety of desi wheat. There was a general preference for home-grown grain over purchased grain, probably in part because foreign matter could be mixed into wheat that would have to be removed. Thus, the price of wheat bought in the market was realistically somewhat greater than the posted market price. There might also be cartage fees. Moreover if many people were to adopt this strategy, the price of desi wheat would rise.

A Jat farmer who followed this course of action explained:

I grew one of the new wheat seeds, 1553. I will sell all of it in the market and buy a trolley of desi wheat for home consumption. We get a good yield from the new variety. Also, it can be sown in a field after paddy and still give a good yield. You can't do that with desi wheat. Besides, the yield of desi wheat is low compared to 1553. I grew desi wheat until the last two years. Now I find it more profitable to grow the new variety.

A Brahman farmer, much better educated than the foregoing Jat although not necessarily a better farmer, described a more sophisticated method for making decisions about which wheat to plant, a plan that involved experimentation. He firmly believed that desi wheat would yield as much grain as the high-yielding varieties if given similar treatment. He planted his fields with this hypothesis in mind. He said:

I grow both the new varieties and desi wheat but this year I have grown more desi wheat. The rate of desi wheat is up to Rs. 150 per quintal. I grow two desi varieties: Ludhiana and 890. I will keep 890 for home consumption and sell Ludhiana because its price is higher. Ludhiana always sells at Rs. 30 or so more than the new varieties. My crop was good this year. I have 1 acre in Ludhiana wheat and hope to get a yield of 40 maunds, maybe more. I also have an acre of 890 and will get about 40 maunds, which are enough for home consumption. I planted 1½ acres in 1553, one of the new varieties. I will keep 15 or 20 maunds for my cattle and sell the rest.

The Brahman evidently had a low opinion of 1553. Both the above Brahman and Jat said that farmers did not keep accounts and calculate profit and loss. We think that many farmers did keep accounts because of the high rate of literacy. The Jat, an elderly man who attended school for less than four years, said that if he kept accounts he would have no time to farm. The Brahman, a matriculate, kept careful accounts and if he lost money on a crop he did not grow it again.

Farmers who were inclined to praise desi wheat for its taste and low cultivation costs as compared to the new varieties, sometimes noted that India needed the greater yield of the high-yielding varieties. After warmly praising desi wheat, a Brahman farmer said, "We grow the new wheat so that there will be enough grain for everyone. India used to have to import wheat from other countries. American wheat has to be grown to feed the population adequately." The villagers called Mexican, or dwarf wheat, American wheat. Two other farmers, the Brahman and Jat quoted just above who similarly extolled the virtues of desi wheat for home consumption, said, "Farmers make the same amount of money whether they grow desi wheat or the new varieties. For the good of the country, they grow the new varieties because the yield is a little more. The increasing population needs more food." Another Jat farmer, who energetically argued the merits of desi wheat with another Jat farmer, nonetheless said, "The new varieties are good for the country because people can be fed [and wheat does not have to be imported]." But a few moments later he said that he was thinking of growing only desi wheat. His companion retorted, "Then the country will starve." We tend, rightly, to emphasize self-interest when writing about villagers, but they are also aware of broader concerns.

The fertilizer and irrigation regime was more complicated in 1977–1978 than in 1958 because of the high-yielding varieties. They needed frequent applications of fertilizer and regular irrigation from sowing to harvest. Desi wheat needed much less attention. Some farmers—we do not know how many—sought expert advice at the beginning of the season. One farmer, in late October on his way to Narela to buy fertilizer, said, "I have a soil analysis done at either Alipur [a village where the headquarters of the Alipur Development Block are located] or Pusa Institute. You have to

know what is lacking in the soil." Another farmer said, "I go to Pusa Institute for a soil and water analysis. I get a crop and fertilizer recommendation and plan my agriculture accordingly. The service is expensive but I think that it is worth it because of the increased yield. It takes money and brains to grow things." He claimed to get 10 maunds of wheat per bigha with the high-yielding seeds. On another occasion, he said that he got only 8 maunds per bigha. A yield of 8 maunds was good; 10 maunds, very good. Farmers who followed the usual sequence of irrigation and fertilizer applications—"who did everything right," as a farmer's wife expressed it—would expect 8 maunds. However, the yield could be much less. On balance, the Jat did better than most of the farmers who did not obtain a soil analysis. The difference in yield would justify spending money for an analysis. A maund of wheat was worth Rs. 50.

For the first irrigation just before sowing, some farmers made low bunds in a field, dividing it into smaller areas so that the irrigation water would be evenly distributed (fig. 39). In mid-November, we decided to visit the fields in the *khadar* area east of the village. We were overtaken by a Jat farmer riding his tractor that was rigged for making bunds. He invited us to ride with him to his fields near another village in the direction of the railway tracks. He had two fields, a large one and a smaller one, that together totaled about 4 acres. His tractor drew an attachment consisting of two metal plates, slightly curved, the concave curve facing inward, and positioned so as to funnel earth into the proper shape for a bund (fig. 40). He worked very fast and finished making the bunds in both fields in about an hour. The bunds were spaced



FIG. 39. Jat Farmers irrigating a field for wheat. Bunds, like the one below the woman, help to control the water and speed the process of irrigation.



FIG. 40. Tractor rigged for making bunds.

about 10 feet apart and were laid out in both directions so that squares were formed to hold irrigation water. We commented on how fast a farmer could work with a tractor. He replied that the bunds would have cost him Rs. 80 to Rs. 90 in labor charges if he did not have a tractor.

A day later in the late afternoon, we were walking in the fields in the *bangar* area and ran into a Brahman farmer standing beside his 1-acre field. Only 3 bighas were planted in wheat: The rest of the field held tomatoes. The Brahman said that he had just finished making irrigation bunds. He did the work with a spade. Because the field had just been sown, he probably could not use a tractor, which would have disrupted the evenly sown rows. In fact, we were puzzled that bunds were made after the field had been sown. Aside from spreading fertilizer and irrigation, fields were usually left undisturbed after sowing. When four children ran across the corner of his field, the Brahman scolded them, telling them to walk on the path. A farmer making bunds in a field would cause more disorder than the brief passage of a few children. But farmers know what they are doing. In any case, bunds apparently reduced the time needed for irrigation. The farmer said that the last time the field was irrigated, it took four hours. The next time, it will take only three hours.

After a few days when a field had dried sufficiently, fertilizer was scattered and the field was sown. At this stage, manure was the preferred fertilizer, but if a farmer had none, then he used a factory fertilizer. A field with high-yielding varieties was irrigated regularly about five or six times, at sowing and then once about every 25 days thereafter. One farmer said that the intervals between irrigations became shorter as

the wheat matured. It took some five months for wheat to ripen. Various factory fertilizers were applied at the first two or three irrigations after plowing. Factory fertilizers had to be accompanied by irrigation because otherwise they would "burn" the wheat. Although many people believed that factory fertilizers were bad for the health, they had to be used with the high-yielding varieties. Desi seed did not have to be irrigated as often as the high-yielding varieties. It was irrigated a month after sowing and perhaps once more as needed. Dung was used as fertilizer with desi wheat.

Tubewells were drilled mainly because the high-yielding varieties of wheat needed water at regular intervals. There were 72 tubewells in the village owned by 42 farmers. Twenty-seven farmers owned only a single tubewell but 12 farmers owned two tubewells and 4 farmers owned three. There was one farmer with four tubewells, and another had five. If a farmer owned a tubewell, his only expenses were electricity, or diesel fuel, and maintenance. If he had to take water from another farmer's tubewell, he paid Rs. 3 per hour for a tubewell with a pipe four inches in diameter. The charge for a six-inch tubewell was Rs. 5 per hour. It took about five to six hours to irrigate an acre with a four-inch tubewell, slightly less than five hours with a five-inch tubewell, and two-and-a-half to three hours with a six-inch tubewell. Four-inch tubewells were usually equipped with motors of 7.5 horsepower. The larger six-inch tubewells required 10-horsepower motors. The big jump in tubewell output was between the four- and the five-inch tubewells with their 7.5-horsepower motors and the six-inch tubewells with 10-horsepower motors. Water pressure affected the output of a tubewell. When pressure forced water close to land level, tubewells could more easily pump it to the surface. Farmers called a case to our attention where a four-inch tubewell slightly outperformed a five-inch tubewell. The difference was the water pressure.

Tubewells were usually powered by electric or diesel motors permanently installed in a brick hut. The tubewell and motor were connected by a leather belt. The attachment usually worked smoothly but not always. On December 9, we watched a Jat farmer trying to irrigate his wheat field, which had been sown on November 16. This was the first irrigation after sowing, and the farmer was struggling with his tubewell. The belt was slipping and not enough water was coming out. He applied a sticky substance to the pulley, but the belt kept slipping. He decided to move the motor back from the tubewell to tighten the belt. This adjustment seemed to help somewhat, but the well was still producing less water than usual. He explained that he had borrowed the belt and it was too narrow. The standard belt for this well would not slip and slide around as this one was doing.

The configuration of tubewell, motor, and hut was not the only arrangement for driving a tubewell. They were also often powered by a leather belt attached to a tractor. A rare method was to use a pumpset, a detachable diesel motor and fan. A farmer rigged his pumpset to a tubewell when irrigation was needed. After irrigating his field, the farmer took his pumpset home with him. We noted only two pumpsets in the village. The one we saw was mounted on a small four-wheeled metal cart.

We saw just one pumpset in action, but it was not attached to a tube well. It was pumping water from a flooded field into a field that was being prepared for wheat in early November. The field had been flooded for several months since the monsoon

in July and was effectively a pond. There was a kind of water lily growing in it and fish could be seen. The owner's daughter stood where the water entered the pump to make sure that no mud or plant stems got into the machinery. The owner, a Jat farmer, pointed out that the project had many advantages: The pond water was manured and would increase the fertility of the wheat field; the water cost the farmer nothing; he could put the drained field into production; and he would have some fish to eat and to sell. The farmer explained that he and his brother, who both had tubewells, jointly owned the pumpset. The motor and fan were solidly rigged and were working well. The installation must have taken some time.

An electric motor was preferred by many farmers because it cost less to run than a diesel engine, either one that was permanently installed in a hut or the diesel motors of tractors or pumpsets. Electric or diesel engines in a hut could be turned on after a minute or two of preparations. Pumpsets and tractors were also always ready for use, but they had to be set in place, which took significant time. A disadvantage of an electric motor was that electric service was interrupted almost daily, sometimes for brief periods but sometimes for the better part of a day.

The most serious problem of an electric motor left in a hut—even though the hut was padlocked—was the possibility of theft. In mid-March we encountered a middle-aged Brahman farmer rushing to his tubewell because during the night a gang had stolen the motors from several tubewells and the Brahman wanted to see if his motor was still there. We stumbled along after him as he walked swiftly and surely along the narrow uneven ridges separating fields that were overgrown in many places by the surrounding vegetation. His father had earlier arrived at the tubewell, and the motor was still there. The farmer's family allowed neither the father nor his middle-aged son to guard the tubewell. The father was very old and his son's health was poor. Younger family members stood guard. The farmer told us that four tubewell motors had been stolen, three of them only about one year old, and we later learned that one or two others had been damaged in an attempted theft. The farmer said:

Generally two men and a dog sleep in [the hut of] my tubewell but no one was there last night. The thieves are very experienced. They know how to remove a motor without being electrocuted. My motor is worth Rs. 3000. It is 7.5 horsepower. The thieves throw away the heavy iron case but keep the interior part which is made of copper wire and is the valuable part of the motor. The outer cover is worth only Rs. 30 or so, but the inner part alone is worth Rs. 3000. Besides, there is a number on the outer case by which the motor can be identified, but no number is on the inner part. There are four or five men in a gang. If they find only one man at a tubewell, they tie him up, gag him, and steal the motor. Sometimes they hide the motor in a wheatfield overnight and remove it the next night. Some gangs are armed. Robbers do not come frequently, but when they come, they stay in the area for a while.

It was not always smooth sailing for robbers. The farmer told of a theft of a tubewell motor in a neighboring village. The thieves were discovered and hid in a field. The villagers surrounded the field and stabbed one of the thieves with a pitchfork.

The man was badly hurt but did not die. The police criticized the villagers for stabbing the man. The villagers said that they did not know who did it, and the police did not pursue the matter. The farmer had thievery very much on his mind, and continued with an account of how mangoes were stolen from the trees in a Brahman farmer's garden. He had engaged a Leatherworker to guard the garden, but the thieves still managed to steal the mangoes. Security is a problem in villages. Houses are locked when no one is at home or at night when people are sleeping, and the theft of crops, water buffaloes, or tubewell motors is a constant worry.

Starting the electric motor of a tubewell involved more than just throwing a switch. We watched the routine of a Brahman farmer as he set his tubewell in operation. First, he struck the motor housing a sharp blow with his hand to drive away any mice that might be inside. He then turned on two lightbulbs to test the electricity. He turned the belt by hand to force out anything in the motor that should not have been there. Then he pressed the starter button. We left the tubewell for a while and upon returning found the farmer greasing a bearing. The machinery had become too hot. These motors seemed to have a tendency to overheat, and someone had to attend to them while they were in operation. A Jat farmer recounted a similar incident. He was working alone in his field while the tubewell motor was running. After an hour, he went to the tubewell to check the motor. It was very hot and he switched off the electricity just in time to avoid a ruined motor.

Tubewells cost about Rs. 10,000 in 1978. They were usually financed by bank loans, secured by a mortgage of farmland. Farmers went to a bank with copies of the patwari records and mortgaged up to 20 bighas of land. The bank usually approved a loan of about Rs. 6000. The bank sent an order to a pipe and motor dealer. The farmer went to the dealer and collected the equipment. The bank usually paid the dealer directly, although in some cases the money was paid to farmers. The loan plus interest was repaid in installments, usually 10.

Some farmers were in a position to make more favorable financial arrangements. One Brahman farmer, who for many years held an urban job, borrowed the money for his four-inch tubewell from his General Provident Fund. The tubewell cost Rs. 11,000 in 1977 and he borrowed Rs. 9000, to be repaid in monthly installments. It was a very good deal for him because the interest that he paid was credited to his own Provident Fund account. He ordered a refinement to his tubewell that cost extra money—an external shaft used to drive a thresher. Threshers were often powered from tubewells. A hole was opened in the brick hut that shelters the tubewell and a belt was passed through the opening, connecting the internal tubewell shaft to the thresher. The problem was that threshing stirs up considerable dust that could enter the building through the hole and get into the motor, potentially damaging it. An external shaft did not require a large unsealed opening.

Another Brahman farmer had a four-inch tubewell that dated to about 1953. It was near the tubewell of the above Brahman farmer. He mortgaged 2 acres of land for a loan of Rs. 3000. He was also required to have two guarantors. The bank loan paid for the motor, fan, and pipe. The farmer paid for boring the well, the brick hut, and the irrigation channel. The total cost was Rs. 6500 to Rs. 7000. The farmer told us that the first Brahman's tubewell (described above) was deliberately drilled to a

different depth than his own so that both farmers could run their tubewells at the same time. Apparently, it does not work too well when two tubewells that are close to one another draw water from the same water level at the same time. This explanation seems reasonable. On the other hand, the first Brahman said that he had to drill deeper than the second man because the first water that emerged had a bad taste and he decided to drill more deeply to find sweeter water.

Sometimes *thans* were associated with tubewells. We noted two such instances. A *than* is a small memorial shrine to an ancestor. A Shiva Lingam, a round or oblong stone representing a phallus, worshipped as a symbol of Shiva, is often inside the *than*. Since we initially thought that the connection of tubewell and *than* was nothing more than geographical proximity, we made no special effort to investigate the association, and there might well have been more such juxtapositions than the two that we noted. Though a *than* was built to honor an ancestor, the Lingam inside could be worshipped on many occasions, and so the connection of *than* and tubewell might have a ritual aspect. That such was the case was suggested by an interview with a Brahman farmer who had a *than* against the wall of his tubewell hut. The farmer, identified in the preceding paragraph as "first Brahman", said:

This is a shrine for Bheron, the Goddess of Water. It is also a *than* for the oldest [deceased] member of my family. I put symbols of Shiva in it. I built the shrine when the tubewell was drilled. Then I built the hut. I built the shrine before reaching water. We had to wait three or four days before striking water. So we washed the shrine in Ganga [sacred] water, made an offering, and poured some Ganga water into the pipe. As soon as we poured Ganga water into the pipe, we struck water. We call the shrine Bheron mandir [Bheron's temple]. [We have not been able to identify Bheron.]

The owner of the second *than* denied any connection with the Goddess of Water. He said that it was simply an ancestral shrine. There were a few clay lamps left in the shrine.

Farmers with fields within reach of the canal could irrigate with canal water if it was available when needed. A farmer explained:

Farming used to be hard labor. Plowing with bullocks was much harder than using a tractor. Also tubewell irrigation is easier than [Persian] well irrigation. In canal irrigation, a great deal of water comes all at once and it requires three men to handle it. Furthermore, the [irrigation] ditch has to be guarded against leaks all the way to the canal. And if water breaks through, you cannot shut the canal to repair the damage as one can do with a tubewell. A tubewell can be managed by one man. Another problem with canal irrigation is that one cannot have complete faith in the canal. The water may not be flowing when needed.

Irrigation by canal took only one to two hours per acre. To irrigate a wheat field from the canal, a farmer paid Rs. 25 per acre for six months no matter how many times the field was irrigated.

Although people commented occasionally that factory fertilizers were bad for health—and the belief seemed to be widespread—they nonetheless had to be used for growing the high-yielding varieties. Farmers used commercial fertilizers for adding three principal nutrients to the soil: phosphorus, nitrogen, and potassium. One farmer said that a small amount of zinc sulphate might also be used where there was a shortage of zinc. They purchased these nutrients in bags of superphosphate (for phosphorus), urea (for nitrogen), and various commercial brands that contained mixtures of nutrients: Kisan Khad (kisan means farmer; *khad* means fertilizer), Ganga Khad, and DAP were frequently mentioned. The bags of Ganga fertilizer were marked with the letters N-K-P, indicating nitrogen, phosphorus, and potassium. The proportions of the components were marked on the bags. We noted the proportions marked on a 50-kg bag—we are not sure of the brand—as 12 (N), 32 (P), and 16 (K). Farmers have to know what nutrients are included when they buy a bag of factory fertilizer. The proportions were important because the soil analyses apparently—we never saw one—were written in terms of nutrients and not by the various brand names of fertilizers. For example, if a field required 100 kg of nitrogenous fertilizer, a farmer could buy either urea (a water-soluble compound of nitrogen) or Kisan Khad. These two fertilizers were the only sources of nitrogen. Urea furnished twice the nitrogen to the soil than Kisan Khad. Therefore, the farmer would have to use 200 kg of Kisan as compared to 100 kg of urea. Of course, Kisan probably contained other nutrients as well as nitrogen, but we did not check the label on a sack to learn the various ingredients.

Factory fertilizers were a significant cost for wheat farmers. Different farmers quoted various prices for fertilizer. A Jat farmer—whom we call Reformer—who had his soil analyzed and kept careful records gave the following account for an acre: Rs. 208 for Kisan, Rs. 80 for superphosphate, Rs. 20 for potash, and Rs. 25 for zinc sulphate, a total of Rs. 333. He cultivated 50 bighas (10.4 acres) of wheat, so he spent about Rs. 3470 on fertilizer. Fertilizer was not added all at once. For example, this Jat farmer applied 50% of the nitrogenous fertilizer when the field was prepared, 25% after the first irrigation, and the rest, 25%, after the second irrigation. He said that superphosphate made the roots strong; potash protected the plant from disease, preserved moisture in the soil, and made the grains thick and shiny; nitrogen made plants green and healthy; and zinc sulphate increased the yield.

We interviewed a Brahman farmer just after he had received his shipment of six bags of fertilizer from Narela. He used urea, Kisan Khad, DAP, and superphosphate, for which he spent Rs. 382 plus cartage. He said that DAP kills insects. He planted 2.76 acres in wheat, so the cost per acre of fertilizer was Rs. 138 per acre, much less than the Jat farmer spent. He said that the previous year he had spent Rs. 600 for fertilizer, or Rs. 217 per acre. However, he did not have his soil analyzed as the Jat farmer did, which might have been a factor in the greater use of fertilizer by the Jat. The Brahman said that he knew how to use fertilizers because everyone had been using them for the past five or six years and he used the accumulated experience of the village as a guide. It turned out that he obtained a very good yield.

The use of factory fertilizer could be adjusted for specific fields as advised by experts. Also, farmers who wanted to economize might use less fertilizer than the amount considered to be most effective. Thus, different farmers reported different

amounts of fertilizer. The figures reported above by the Jat farmer are probably the maximum dosage. Other farmers reported much smaller amounts, for example, 25 kg of urea per acre. However, this figure referred to a single application. If two or possibly three treatments were needed, the amount required increased in proportion.

Farmers kept close watch on their growing wheat and applied an appropriate fertilizer if the crop appeared weak. In late December, we encountered a Brahman farmer, a schoolteacher, on the way to his wheat field carrying a bag of Ganga Khad. His wheat was weak—short and yellowish—and he hoped that urea would correct the problem. A well educated man, he knew that Ganga Khad contained other ingredients as well as nitrogen. This farmer had not obtained a soil analysis, claiming that there were not enough centers where soil could be checked. Apparently, he “guessed” as to what was needed. We were puzzled. He could have consulted one of the expert village farmers. The wheat in an adjoining field was much better than his own although still a little weak. He remarked that the neighboring farmer, a member of his lineage, had used fertilizer. As we were leaving, he filled a bucket with fertilizer and began to broadcast it on the field (fig. 41). Irrigation usually accompanied the broadcasting of fertilizer to dissolve and spread it. The Brahman said that in this case dew would dissolve the fertilizer. Because the evidence was in plain sight in the fields, everyone knew who was a competent farmer and who was not. It was not only for money that farmers wanted good-looking fields; it was also for pride and prestige. Several times farmers with an exceptionally good crop called to us as we were passing by to stop and admire their fields with them.

Sowing by bullocks in 1977 was essentially the same as in 1958. The farmer attached a sowing tube (or seed drill) to a light plow used especially for seeding and carried a bag of seed. Figure 36 shows a Watercarrier sowing the field of a Jat. He dropped the seed through the tube while directing the bullocks with a light whip. The technique involved considerable dexterity and was difficult to learn. A Jat farmer, observing a field being sown with bullocks, remarked that a tractor was better because the wooden plow used with bullocks made wide furrows and the tractor made narrow ones. The density of plants in a tractor-sown field would therefore be somewhat greater than in one sown by bullocks.

A bullock-sown field was weeded once after about 25 days. Weeding increased the yield and also helped to prevent wheat threshed by machine from being contaminated by the seeds of various weeds. A field sown by tractor could not be weeded because the rows were so close together that there was no place to stand. In 1958, villagers said that wheat was not weeded.

Most wheat was sown by tractor in 1977. On November 17, we went to the fields to observe and photograph sowing by tractor. An elderly Brahman, picking greens for the evening meal, indicated a nearby field where a Jat was working. The tractor driver, Rajesh, was the son of the Jat landowner, Sohan Lal. Sohan Lal, three Brahmans, and several children were watching the operation. The Brahman with his bag of greens, who had just arrived, and another Brahman, Mahabir Singh, were there because the Jat would next sow their fields.

The sowing proceeded very quickly. The field was a little less than 1 acre. The area to be sown was reduced slightly from the standard 1-acre plot because a small

FIG. 41. Brahman farmer broadcasting fertilizer in a wheat field.



area was occupied by berseem and a tubewell juttied out into the field. Our companions said that the field would be sown in 20 or 25 minutes. We asked them for a comparison of sowing with a tractor and with bullocks. They were a little undecided and changed their estimates a few times but finally decided that it took five to six hours to sow 1 acre with bullocks. The maximum would be 2 acres in one day. With a tractor, 12 acres could be sown in a day.

The seeder had nine prongs for making furrows, tubes attached to each prong, and a box sitting over the prongs in which seed was poured. The bottom of the box was slightly funnel-shaped over the entrance to each tube and there was an axle with a wavy wheel over each opening which turned as the tractor moved (figs. 42, 43). The wheels agitated the wheat and kept it feeding into the tubes. The axle was powered by a chain attached to a sort of paddle wheel that engaged the ground. As the tractor moved, the paddle wheel turned, which rotated the axle, and the seed fed through the tubes. The seeder was called a sowing machine (*bone ki machine*, *bona* means "to sow").

There were 16 seeders in the village, all owned by Jats. A few were owned jointly. All the owners had only one seeder, except for one man who owned two. It was unnecessary for every farmer to own all the expensive modern farm equipment—seeders cost Rs. 900—because one could hire equipment as needed. Seeders were not hired as separate items but as a unit with a tractor. Thus, a farmer who needed to sow a field hired



FIG. 42. Seeder. The wheat in the box is stirred by revolving disks so that it feeds evenly through the tubes below the box.



FIG. 43. Sowing a wheat field. A farmer walks behind the seeder to make sure the seed is moving through the tubes.

a tractor with a seeder just as he might hire a tractor with the necessary attachments to plow his field. The fee was the same for sowing or plowing, Rs. 25 per acre.

The tractor sowed a section of the field in sort of an oval pattern, working outward. After a given size was reached, another area was sown in the same way. When the tractor approached the end of the field on one of its passes, the seeder was raised and lowered again after the tractor had made its turn. Thus, the area near the edges of the field was not sown. Then after the field was entirely sown except for the edges, the tractor made two passes down each edge of the field at right angles to the line of the rest of the sowing. In this way the edges and the corners of the field were properly sown.

Bullocks were sometimes used in the corners of fields. They also sowed the regularly spaced rows of mustard that divided a field into harvesting lanes. Informants said that the rows of mustard were sown about 10 feet apart. One informant said that 14 rows of mustard were sown in an acre, which would mean that the rows were about 15 feet apart.

When the sowing began, a wooden plank (*mej*) was attached behind the seeder (fig. 42). It was later detached. The villagers explained that the part of the field near the tubewell was being leveled for use during threshing. The thresher was powered from the tubewell, and the chaff would be ejected onto the smooth area where it could be collected more easily than if the area were uneven. Smoothness did not matter in the rest of the field, and so the plank was detached. It was not necessary to cover the seeds after sowing, they said, because the seed was sown four or five inches deep.

After Rajesh had sown his father's field, he drove the tractor to Mahabir Singh's field. Before moving the tractor, the seeder was emptied because the seed belonged to Sohan Lal. When the tractor arrived at Mahabir Singh's field, he filled the seeder with his own seed, *hira moti* in this case. Only 3 bighas of the 1-acre field were to be sown in wheat. Tomatoes were in the rest of the field. Rajesh began to sow the field rapidly. Mahabir Singh ran behind the tractor, lifting the top of the seeder from time to time to see that the seeds were coming out properly. Although the tractor driver can see that there are seeds in the tubes, he cannot tell if the seed is moving through the tubes. This is why a man often walks behind a seeder and periodically checks to make sure that the seed is moving properly (fig. 43). There was some trouble sowing this field because grass was accumulating in front of the seeder causing soil to pile up. The tractor had to be stopped occasionally to remove the grass and soil.

Sohan Lal, who was watching, said that the field had not been properly prepared. Turnips had been in the field just prior to sowing wheat. After the turnips had been harvested, the field was hurriedly plowed and some grass was left. It was this grass that fouled the seeder. Sohan Lal said that the proper technique was to plow a field, let the grass dry, and then plow again after 5 or 10 days when the grass was dry. It would be plowed under and would not grow again. At this point, someone called out to ask why the tractor was stopping so often. Mahabir Singh and Rajesh answered that it was because of the grass.

Newly sown wheat fields had to be guarded to protect them from birds. We saw only one instance, but we assume that guarding fields was a common activity because

the problem of birds affected all wheat farmers. In mid-November we were walking home from the fields in late afternoon when we saw some people in a newly sown wheat field scaring away birds. They were probably members of the family that owned the field. The birds, active in late afternoon, eat the small sprouts just after they emerge. By early December, wheat was high enough to be safe from birds. There was no longer any seed to eat. As a farmer told us in 1958, when a seedling divides to produce two leaves it is safe from birds. On November 26, we went out to the fields but gave up and returned home. There was no activity anywhere. The sowing of wheat appeared to be finished. By December 6, the wheat was four or five inches high.

Although the villagers knew that, on average, the high-yielding varieties returned double the yield of desi wheat, which was vital for the country, they think about, and argue, whether there is more money to be made with the new wheat than with improved desi wheat. This issue invariably involves other issues, so the villagers' evaluations take in a number of factors. In mid-April, at the height of the wheat harvest, we heard two Jat farmers passionately debating the relative merits of the new and traditional agriculture. One of the Jats, whose pseudonym was Reformer, was a modern man who extolled science and progress. The opposing view was argued by Actor, a clever man who loved nothing more than a good argument. Traditional agriculture for him meant not only sowing desi seed but also using bullocks, at least for plowing, if not for threshing.

After a short discussion of bullocks, Reformer said, "Today is an age of science. You [Actor] are 50 years old and set in your ways. But progress depends on science and we must move with it." Actor replied, "The more science there is the weaker men become." If we were keeping score, we would have given a point to each man.

Reformer elaborated:

With bullocks it takes two months to thresh wheat. People who use bullocks will remain behind. Before land consolidation, I had 60 bighas and never got more than 100 maunds [of wheat]. Now, I do one-quarter of the work and get 400 maunds from 50 bighas. I used to return from my job [headmaster in primary school] and begin to farm right away. Previously, only strong men [such as he] could plow. Now wives and sons can plow. The work is much easier.

At this moment, some children arrived to report that Reformer's laborers had come. He was engrossed in the discussion and did not want to leave. He said, "Give the laborers food and water and I'll come to the fields later."

Actor was intent on proving that traditional agriculture was more profitable than mechanized agriculture. He pointed out, in a general way, the expenses of modern farming. It cost Rs. 2000 to operate a tractor. It cost a tractor owner Rs. 10 to plow 1 acre. There were labor and fertilizer expenses. He referred to a trip to the wheat market that he and his brother made together. He had a trolley of desi wheat; his brother had a trolley of one of the new varieties. Because of the difference in price that favored desi wheat, he received Rs. 1300 more than his brother.

Nonetheless, he cultivated one of the new varieties, but was thinking about returning to desi wheat. He said:

I grow 600 maunds of wheat, but in a couple of years, I plan to go back to desi wheat. I abandoned it because of lodging, but I still got $3\frac{1}{2}$ maunds per bigha. The usual yield is 6 maunds per bigha. The new varieties yield from 7 to 8 maunds. I'm sick and have to eat desi wheat. [A very good yield for desi wheat would be 5 maunds per bigha; for the new varieties, 10 maunds.]

Feigning concern for Actor's alleged illness, Reformer suggested that he eat one of the superior varieties and be cured. He conceded that desi wheat is tastier but noted that families needed cash and so they grew the new varieties because the yield was double. Actor conceded that the new varieties were good for the country because people had to be fed.

Reformer took up his own case to show how much money could be made with the new varieties. He said that his expenses on wheat were Rs. 1000 for seed, Rs. 4000 for fertilizer [just above, the figure was Rs. 3470], and Rs. 2000 for his tractor,³⁰ a total of Rs. 7000. He sold wheat for about Rs. 16,500. So he made a profit of Rs. 9500. Actor did not believe these figures. In fact, they are good approximations of Reformer's expenses and revenue.

Actor countered with the case of a Jat who farmed with bullocks. He said, "Jai Gopal grew 350 maunds of wheat. He farms with bullocks the same amount of land as you farm with a tractor. He spent Rs. 2000 on his bullocks and Rs. 2000 for a plowman. He sold wheat for Rs. 16,500." Actor did not mention seed or fertilizer. He probably used dung for fertilizer, and so there was no cost. As for seed, we will arbitrarily add Rs. 1000 for seed. The total cost was Rs. 5000 leaving a profit of Rs. 11,500. Actor asked, "Who made more money, you or Jai Gopal?" Reformer replied that Jai Gopal had more land than he. He did in fact have 15 more bighas. If we add the estimated profit from 15 bighas of wheat, about Rs. 2850, to Reformer's net revenue from his 50 bighas, he made Rs. 12,350. These figures are very crude. Too much is left out of the account, such as harvesting expenses. However, with regard to wheat, the two farmers had similar profits.

That is not the whole story. Actor threw into Jai Gopal's account his income from tomatoes, Rs. 10,000. Reformer did not grow tomatoes. Except for some vegetables grown for home consumption, all his land was in wheat. Reformer did not like the problems associated with tomato cultivation and moreover, he had a full-time job that left little time for morning trips to the vegetable market. Reformer earned Rs. 10,000 from his job, which income balances the money that Jai Gopal earned from tomatoes.

It is possible that farmers could earn as much with desi wheat as with the new varieties, but there will be no significant return to it. The major advantages strongly favor the new varieties. Their yield is double that of desi wheat, they have a shorter growing season, and they resist lodging better than the taller desi wheat. Most people prefer the taste of desi wheat, it yields more chaff, its grain is harder and more resistant to insect pests than that of the new varieties, and it sells at a premium in the market. For these reasons, farmers will continue to grow some, but the acreage devoted to it will probably not move appreciably higher than the current 10%.

However, a demurral is in order. In Punjab, there seems to be a significant shift away from the high-yielding varieties of rice because of changing economic conditions. Chand and Haque have recently observed:

[T]here seems to be a large-scale shift in area from high yielding modern rice varieties to basmati varieties which have lower yield potential but have become more remunerative due to fast rising demand for exports and from high income domestic strata. Basmati varieties also draws [sic] less on natural resources like water. [Chand and Haque, 1998: A-110]³¹

It is possible that a similar development might one day take place in wheat cultivation.

In any case, modern mechanized farming is here to stay. Even Actor, who enjoys arguing—probably with tongue in cheek—for the advantages of desi wheat and farming with bullocks, has a tractor and all the equipment that goes with it. Neither he nor his sons will ever again farm in the old style. A modern man like Reformer would never go back to bullocks. Men have urban jobs and have no time to waste by plowing with bullocks. Most young men no longer know how. Farming is now much lighter work than it once was. In this part of India, the era of wooden plows and iron men is gone. Few farm families would regret its passing into history.

But Actor was not necessarily a dinosaur, an aging farmer nostalgic for the “good old days”. Modern mechanized farming has its sophisticated critics as well, who find fault with it on a variety of grounds: costly inputs, displacement of labor, environmental damage, destruction of biodiversity, replacement of necessary plants—pulses and oilseeds—by the monocultures of wheat and rice, and quasi-imperialism. Shiva argues the case against modern agriculture:

The high “productivity” of modern agriculture is however a myth when total resource inputs are taken into account. The social and ecological costs with respect to the manufacture and use of fertilisers, pesticides and labour replacing energy and equipment are never taken into account, thus rendering the system artificially productive. If the energy used to provide all the inputs to modern farming are [sic] deducted from the food calories produced modern agricultural technologies are found to be counter-productive. Whereas at the turn of the century even in the countries of the north, one calorie of food value was produced by the input of less than a calorie of energy so that there was a net gain, today 10 calories of energy are used to produce the same one calorie of food value. [Shiva, 1991: 2743]

Shiva extols alternative agriculture, pointing to cases where farms that use it out-produce farms using standard methods (Shiva, 1991: 2744).

Be that as it may, the North Indian farmer grows high-yielding varieties and uses all the equipment that goes with them because it is profitable and relatively easy work, and, as a bonus, he knows that India needs the high yields to feed her growing population. He is concerned with his own expenses, not with the “real” costs of electricity or water. The Government and the market lead him in the direction of modern farming with the carrot of subsidies and assured prices. India is a democracy, and



FIG. 44. Women harvesting wheat with serrated sickles. Stems of wheat were used to bind sheaves, some of which lie on the ground behind the women.

people are free to make choices. If alternative agriculture proves itself to be a better deal than current farming methods, then people will go in that direction.

WHEAT, 1958, FROM HARVEST TO STORAGE AND SALE

The wheat harvest began in mid-March; harvesting, threshing, and winnowing were generally completed by the first week of May. The yield of wheat averaged 3 to 4 maunds of grain per bigha and 4.5 to 8 maunds of chaff, a chaff to grain ratio of roughly two to one. Wheat sold for Rs. 16 per maund; chaff, used for fodder, sold for Rs. 3 per maund. Harvesting expenses were 5% of the harvest; each worker received one sheaf out of each 20 that he or she cut. Harvesters, working in a bending or squatting position, grasped several stalks of wheat in one hand and cut them close to the ground with a serrated sickle held in the other hand. Workers laid the wheat behind them and continued to cut, moving back and forth across their working areas as marked by rows of mustard. Periodically, they stopped to tie the cut wheat into sheaves, using stalks of wheat as cord (fig. 44).

At the end of the day, the sheaves were arranged in rows of 20, and a farmer paid his workers, an event often marked by considerable contention. The workers did not make all their sheaves of equal size. When they were paid, they tried to take the larger sheaves. As one farmer somewhat sarcastically explained, the harvesters tied small sheaves for counting and large ones for payment. Farmers were alert in guarding against this practice. We watched one farmer as he paid his laborers. A worker, according to customary practice, took a large sheaf from one row of 20 and a smaller sheaf from the next row. If a row were a few sheaves short of 20, a worker had to be content with a smaller sheaf. The farmer whom we were observing was especially alert; occasionally, he snatched a large sheaf from a harvester and forced him to accept

a smaller one. On the other hand, some farmers were generous. We watched one farmer who was standing on his bullock cart loaded with sheaves to be transported to his threshing floor. His workers were standing on the ground looking up at him expectantly. They knew what he would do. He tossed a couple of additional sheaves to each of them.

A worker was capable of cutting an average of about 200 sheaves daily, according to farmers, who estimated that a sheaf yielded from $\frac{1}{2}$ to 1 seer of wheat and approximately twice that amount of chaff. Therefore, in 1958–1959 a harvester could earn about Rs. 4 per day, a favorable wage when compared with the rate of Rs. 1.50 for daily wage labor. Landless laborers cited lesser earnings from harvesting than did landowners, chiefly because they managed to cut only about 150 sheaves per day, but, nonetheless, an experienced harvester could earn more than the then-current rate for daily wage labor, sometimes considerably more. The opportunity to work in the rabi harvest was one of the advantages of village residence for a landless person, even if he held an urban job. He could supplement his income by taking some of his leave during the harvest. However, urban workers frequently became unaccustomed to field work and were unable to harvest as much wheat as more experienced workers.

After a field had been harvested and the sheaves transported to the threshing floors, a fair number of stalks and ears remained scattered about the fields, which were then available for gleaning. The owner of a field had the right to glean it and would do so if he had insufficient wheat to see his family through the year. If he preferred not to glean the field himself, he could arrange to have someone else do the work, and the two parties then divided the wheat equally. Often, a farmer reserved gleaning rights for his Sweeper. If the right was not assigned to the Sweeper, it was customary for any low-caste person to glean the field, keep half the wheat, and give



FIG. 45. Brahmans gleaning in a wheat field.

half to the landlord. However, gleaners sometimes kept all the wheat for their own use. In such cases, we do not know whether the landowners agreed in advance or whether they were unaware that someone had gleaned their fields. Some farmers may simply have had no interest in the wheat that could be gleaned in a harvested field. In any case, it was impossible for any farmer to keep his fields under constant surveillance. Landless people had traditional rights with regard to the use of fields, and



FIG. 46. Jat Farmer threshing wheat in 1958 with bullocks and no drag. When bullocks are about to drop dung, the farmer picks up some chaff to cover his hand, catches the dung, and throws it aside.



FIG. 47. Threshing wheat in 1958 with a drag of brush weighted with sheaves of wheat.



FIG. 48. Woman threshing wheat with a stone roller.

it was easy to infringe the line between what was permissible and what was not. Gleaning wheat fields was a moderately profitable venture. A Leatherworker woman told us that during one day she had gleaned 3 seers of wheat, worth Rs. 1.20. A Potter woman said that she gathered from 2 to 5 seers each day and kept all the grain (fig. 45).

Farmers often engaged laborers to help thresh and winnow their wheat. Usually laborers were hired on the basis of a seasonal contract that paid from 3 to 5 maunds of wheat for the season, depending on its duration. The typical contract paid 4 maunds of wheat for one month of labor. These workers received no chaff. Sometimes, daily labor was hired at the rate of Rs. 2 and meals, according to a Sweeper, or at Rs. 1.50 and no meals, as reported by some Leatherworkers.

Each family used its own threshing floor, usually located just outside the village habitation site on village common land. Sheaves of wheat, transported to the threshing floors in bullock carts, were piled about 2 feet high in a circular arrangement. A yoke of bullocks, usually hitched to a drag made of tree branches and shrubs or to a stone roller, was driven around on the wheat until the grain had loosened from the ears and the stalks were broken into small pieces (figs. 46, 47, 48). Villagers estimated that it took from 8 to 12 days to thresh 100 maunds of wheat with bullocks. Threshing with a tractor—there was only one in the village in 1958–1959—was five or six times as fast. The sheaves were arranged in the same way as for threshing with bullocks. Disk harrows were hitched to the tractor and behind them was attached a traditional drag of branches. The tractor was driven around over the wheat until the grain was separated from the ears.

FIG. 49. Women winnowing wheat. The three-legged stool on which one woman is standing is customarily used for winnowing. She uses a winnowing tray cut from a kerosene can. The woman to her left wearing a red head-cloth prepares to hand her a basketry tray filled with wheat and chaff. As the mixture falls to the ground, the wind blows the lighter chaff to one side. The seated woman sweeps bits of chaff off the grain as it accumulates on the ground.



Winnowing was arduous because the winnower, often a woman, had to hold a 2- or 3-seer load overhead for minutes at a time all day long. A few seers of grain and chaff were placed on a winnowing tray by one laborer who passed it to another who stood on a stool or on the end of a cot. Taking advantage of a breeze, the worker on the stool gently shook the winnowing tray so that a slow steady stream of wheat and chaff fell to the ground. The wind blew the lighter chaff to one side, thus separating it from the grain. Sometimes a third worker squatted on the ground and, using a small broom, swept the residual chaff off the pile of wheat as it accumulated (fig. 49). Winnowing trays were made either of basketry or of part of a kerosene tin cut in the same shape as a winnowing basket. The time needed to winnow 100 maunds of wheat depended upon the number of workers employed and also upon the strength of the wind and how long it continued to blow. It was possible to complete the work in one day or it could require as many as four days.

Threshing and winnowing were just about over by May 5. Only a few landless Leatherworkers were still threshing and winnowing grain that they had received in payment for their work in the harvest. According to farmers, the Leatherworkers were using the farmers' threshing floors and bullocks free of charge. The Sweepers who

guarded the crop also used the threshing floor and bullocks belonging to a farmer. The use of the threshing floor was free, but, according to the Sweepers, they paid 10 maunds of fodder to use the bullocks. When we visited their threshing floor, they complained that one farmer, notorious for failing to pay his workers, had cheated them by paying for fewer bighas than he had cultivated.

Farmers stored sufficient grain and chaff for their own use throughout the year. They sold the remainder in the village or at the wholesale wheat market in Narela. Well-to-do villagers kept their wheat in their houses in large, very heavy jute bags which cost about Rs. 50. Poorer people constructed bins of clay mixed with straw which had small wooden doors. They held about 60 cubic feet of grain. A carpenter charged about Rs. 5 for the wooden parts. A householder constructed the rest of the bin himself.

Chaff was often stored outdoors in large stacks (*boongas*), shaped and held in place by an outer layer of twigs and straw, which also served to protect the chaff from wind and rain. Farmers who planned to build such a stack kept a supply of unbroken wheat straw for the outer cover. First, a circular trench was dug and twigs were placed vertically in it to reach approximately three feet aboveground. About a foot from the ground, a thick bundle of twigs was fastened horizontally to the vertical twigs around the entire circle. This horizontal twig reinforcement was tied to the vertical twigs with a rope. The interior of the circular enclosed area was filled with chaff. Then, as



FIG. 50. Wheat chaff is stored outdoors in conical stacks (*boongas*). A half-completed stack is on the left. Bundles of wheat straw used to make the wall of the pile are on the ground, right.

the quantity of chaff was increased, an outer covering was built upward consisting of rows of straw laid vertically to the ground, each held in place with ropes. A heavy rope was wrapped around each row of straw and a slender rope was passed diagonally back and forth between adjacent coils of the heavy rope. Each successively higher row of straw was leaned inward so that the stack assumed a domelike shape (fig. 50). The apex was often surmounted by a pointed straw top. Some farmers liked to speculate in fodder by buying and selling such stacks.

Most villagers preferred to sell and to buy wheat in the village rather than at the market in Narela. Such transactions were based on the current price at the urban market. By buying and selling in the village, villagers saved not only the cartage cost of 6 annas per maund but also the broker's commission. However, the poorer villagers complained about one aspect of wheat sales carried out in the village: When wheat was bought on credit, a seller sometimes charged some Rs. 2 above the market price.

Villagers reported that when they sold wheat in the Narela market, a maund was weighed slightly more than 40 seers, but when they bought wheat, a maund was weighed slightly less. Moreover, they said that dealers habitually mixed sand with the grain to increase its weight. Farmers also added sand to grain, explaining that this normally happened because of the earthen threshing floor. But one man told us that wheat stored better if a little sand was mixed in it.

We visited the Narela wheat market at the end of April when the wheat crop had been almost entirely harvested and threshed. Wheat, selling then for Rs. 14.75 per maund, was piled on the ground. An agent was selling it for farmers who watched intently. A number of businessmen were bidding. The bidding was not fiercely competitive, and the participants interrupted their activities for a few moments to talk to us. The market in Narela provided a useful sales outlet when a farmer needed cash in a hurry and found it impossible to arrange a favorable sale in the village.

WHEAT, 1978, FROM HARVEST TO STORAGE AND SALE

In 1958, farmers grew only desi wheat. In 1978, dwarf wheat was the dominant variety, but desi wheat was still being cultivated. Dwarf wheat could be harvested more quickly than desi wheat, which had a tendency to lodge, entangling the stalks. It was difficult to move the sickle quickly. In mid-March, we visited the fields after a storm. We compared its effects on the wheat in two adjoining fields, one with desi wheat, the other planted in one of the dwarf varieties. The dwarf wheat was unaffected, but some of the desi wheat had lodged. Another advantage of dwarf wheat over desi wheat for harvesters was that the plants were closer together, so that somewhat more dwarf wheat could be cut in a given time period. A harvester did not have to move so far sideways to cut successive sheaves.

In 1978, farmers said that a healthy, skilled harvester could cut about 150 sheaves of wheat in a day, without specifying the variety. We examined a Jat farmer's account sheet for 11 of his harvesters, 10 women and one old man. The farmer, whom we name Sohan Lal, was one of the "big growers" with 17 acres in wheat, almost certainly one of the new varieties because with such a large farm he was growing most of his wheat



FIG. 51. Woman harvesting wheat, 1978. The method was the same as in 1958. The harvester cuts a handful of stalks near the ground with a serrated sickle.

for the market. The average number of sheaves per harvester that had been cut by about 5:00 p.m., the end of work for the day, was 77 (fig. 51). A few days later at 8:30 a.m., we encountered two groups of women, one of Leatherworkers and the other of Sweepers, heading for the fields carrying their sickles and food. They would work until about 5:00 in the afternoon, a workday of about eight hours, which was standard for women harvesters, and harvest roughly 80 sheaves, or 10 sheaves per hour.

In 1958, farmers said that a harvester could cut 200 sheaves of desi wheat in a day. However, from a Leatherworker family, we learned that four adults of the family had each worked seven days during the harvest and in payment they had received 200 sheaves. Thus each worker had cut an average of 143 sheaves a day. We think that the best crude estimate of the number of sheaves that an experienced harvester could cut working from early morning to late afternoon in 1958 was about 145.

We are puzzled by the large difference between the figures from 1958 and from 1978, especially since we were told that dwarf wheat could be harvested more quickly than desi wheat. Our data suggest that the harvesters in 1958 were cutting almost twice as many sheaves per day as those working in 1978. We can only speculate as to the reasons. Perhaps smaller sheaves were cut in 1958 than in 1978, or maybe the harvesters in 1958 were more skillful than the later workers. Our comparison of

harvesters involves only villagers from Shanti Nagar. In 1978, much of the crop was cut by Biharis, and combines were also available, both of which would mean less practice for the local people. Perhaps the skills and stamina of the locals had declined.

On our way to Delhi on Sunday, April 2, 1978, we saw wheat being harvested in a nearby village. It was the first harvesting that we saw. When we returned to Shanti Nagar two days later, we saw sheaves of wheat on the roof of a Leatherworker house just behind our own, and so the harvest had started in Shanti Nagar. All the wheat did not ripen at the same time because it was not all sown at the same time. Moreover, desi wheat, with a longer growing season than dwarf wheat, ripened a bit later, although this difference could be compensated by sowing desi wheat earlier than dwarf wheat. Nevertheless, the later ripening of desi wheat could often be observed in the fields. On the fifth of April we were walking between the wheat fields of two Brahman farmers, one sown in desi wheat, the other in dwarf wheat. The dwarf wheat was ripe, but the desi wheat still had a short way to go.

Family members, Harijans (i.e., landless villagers in this context), and migrant laborers from Bihar worked in the harvest. No one wanted to miss the opportunity. The pay was very good and people then had homegrown wheat to eat. Local harvesters earned 1 sheaf per 20, or 5% of the harvest. If harvesters could manage to take the larger sheaves, they earned more than 5%. The Bihari men worked in gangs on contract. They harvested an acre for Rs. 85. They cut the wheat, tied it into sheaves, and piled the sheaves in the fields ready for transport to the threshers. We asked one farmer which harvesting method was cheaper for the farmers and he instantly said that cash payment to the Biharis was cheaper. We calculated the value of an acre of wheat—not counting the chaff—at Rs. 2000 (16 quintals at Rs. 125 per quintal) so 5% amounted to Rs. 100.

Combines were the fastest and the most costly method for harvesting wheat. Three government combines were available, but a Jat farmer told us that two were out of order that year and the third would be used to harvest government farms, such as the one at Pusa Institute. It would not go out to the villages. The government combines charged Rs. 125 to Rs. 130 per acre. There was also a private combine operating in the region, but it was expensive. With the government machines out of action, the private combine had increased its charges by Rs. 30 to Rs. 160 per acre. Our Jat informant, a cousin of the *pradhan*, named four Jat farmers who nonetheless would use the combine. The *pradhan* planned to use it to harvest 10 acres in the *bani* area at the western edge of the village. Another farmer said that he also used a combine to harvest his fields in the *bani* area and, according to the *pradhan's* cousin, his fields on the eastern edge of the village as well. In both 1976 and 1977, he spent Rs. 780 to harvest 6 acres. We received the impression that combines were used for inconveniently located fields.

Harvesting was equally lucrative in both 1958 and 1978. In both years, harvesters earned about twice the daily wage, which was Rs. 1.50 in 1958 and Rs. 7.00 in 1978. Farmers preferred laborers from Bihar to local labor because they were cheaper and also they were less trouble. When Biharis worked under a contract, the farmer did not have to come to the fields in the evening to pay them in sheaves. Moreover, they showed up for work as per agreement. Local workers had to be called daily. However,

there were not enough Biharis to cut all the village wheat. We also believe that farmers would have to use a good deal of village labor because of longstanding family ties.

The system of paying harvesters with sheaves is not precise and can lead to arguments and anger, sometimes escalating into fights. Sheaves are not all the same size. Harvesters want to take only the larger ones in payment. Farmers complain that their harvesting expenses can rise above 5% if they are not careful. The other problem is that sheaves are bulky units, generally indivisible. If a harvester falls short of 20 sheaves, how is she to be paid? The general custom seems to be that if a row is a few sheaves short of 20, the harvester has to be content with a small sheaf. If a row is a few sheaves more than 20, the worker may receive nothing for the additional sheaves. We have two supporting cases to offer. An elderly man ended the day having cut 68 sheaves, and the landowner gave him only three sheaves. He did not protest. A woman who cut 81 sheaves received four sheaves, leaving one sheaf uncompensated. She and the landlord had a mild argument over the size of the sheaves. She wanted to take heavy ones, possibly thinking about the uncompensated sheaf, and the landlord wanted to give her light ones. They quickly compromised; she took two of each kind. On the other hand, some landowners were generous and might give each of his workers a couple of additional sheaves.

On April 8, we went to the fields late in the afternoon to watch farmers paying their harvesters. We rather expected to see a number of disputes over payment, especially as regards large versus small sheaves. We were not disappointed. In such arguments, we believe that most of the pressure is on the landlord because he has to deal with possibly 10 or more harvesters. After a while, he is worn down, becomes angry, and may be provoked into a fight. For the harvesters, payment is a serious economic matter. Most of them are poor, and an extra kilogram or so of wheat means several meals.

Several harvesters were working in a field near Sohan Lal's tubewell so we went there. In an adjoining field, which also belonged to Sohan Lal, all the wheat had been cut, tied into sheaves, and stacked. A woman was harvesting the mustard, which is planted to mark lanes in a wheat field. She was the wife of Rajesh, the son of Sohan Lal. Mustard, always cut with home labor, is harvested after the wheat is out of the way. Two men, a middle-aged Brahman farmer and a young Jat farmer, Sanjay, who were nearby, told us that someone would sleep at the tubewell to keep an eye on the stacked sheaves, which were particularly vulnerable to thieves.

Rajesh was in charge of paying the harvesters, called *lawa* in the village language. All the harvesters were either Potters or Leatherworkers, the latter much more combative than the Potters. Rajesh and Sanjay told us that the Leatherworkers would cheat, but not the Potters. When Rajesh was paying the Potters his wife complained that he had not counted the sheaves. Apparently, he did not feel that he had to be particularly careful with the honest Potters.

Rajesh moved to the other field to pay eight Leatherworker women. He stood in the middle of the field and women gathered at the edge of the field along a road. Rajesh called to the women to come to him. They wanted him to come to them. Rajesh and Sanjay explained that the heavier sheaves were near the women and the lighter ones were in the middle of the field near Rajesh. At the tubewell, several men



FIG. 52. Paying the harvesters. A Jat farmer and a Leatherworker woman argue over which sheaves she will receive. The farmer has just withdrawn a sheaf from her pile, intending to replace it with a lighter one.

were bathing. Rajesh called to them to be careful and not let water run into the field where he was with his wheat.

Rajesh tried to pay a woman who had cut 80 sheaves. He piled four sheaves near her, which she refused. She took the ones that she wanted, complaining that the sheaves near Rajesh were too light. Another woman took the sheaves that she wanted, but Rajesh took one of them away from her. She refused to take the sheaves that he offered. He began to get angry. The woman finally took two of her sheaves from those that Rajesh had selected. Rajesh was outnumbered, and for a few minutes we thought that all the women were going to take the sheaves that they wanted, but it did not work out that way. In the end, Rajesh managed to hold his own (fig. 52).

One woman was said to have cut 162 sheaves, but when we checked Rajesh's record somewhat later, this total was for two women. In any case, there was an argument with this woman. She said that she would not take any sheaves unless she could have the ones that she wanted. She finally accepted four that she wanted and four that Rajesh wanted to give her. Then when she had carried her sheaves to the side of the field, she exchanged them for larger sheaves when Rajesh was not looking. Sanjay pointed out the exchange to Rajesh and to us. Rajesh accused her of exchanging sheaves. She replied that the Jats exploited the Harijan women. Rajesh said that he would not give the women sheaves that day if they didn't take the ones that he wanted them to take. She became angry.

The action moved to the road at the edge of the field where the women had their sheaves. The women bundled up their sheaves in a cloth. One woman took her bundle of four sheaves and left. Another woman began to tie up her bundle, but Rajesh stopped her, took the stack apart, removed a sheaf, inserted another, and forcefully tied up the bundle. She complained. She said that she had taken two sheaves from one side and two from the other side, but Rajesh did not agree. She said that she had to eat. Rajesh was unmoved. He brought two sheaves, the kind that he wanted the women to accept, from the field to the road.

Sanjay entered the argument, pointing out to the aggrieved woman that farmers do not earn much from their land. The woman scornfully dismissed the Jat's complaint. She advised him to give his land to the Government if he did not earn enough from it, and she scolded him for telling Rajesh that the women were surreptitiously exchanging sheaves.

At about 6:35 p.m., all the payments had been made and workers began to carry their sheaves home. Children helped. Rajesh's wife came into the field and began to cut mustard. Some of the women remained behind and, working very quickly, began to make a large pile of the sheaves. We were a bit surprised because we thought that all the contention might have embittered the women and they would be eager to leave. However, harvesting customarily requires that sheaves be piled up at the end of the day, and the women were honorably finishing the job. Rajesh and Sanjay explained that a high pile was desired because if it rained, less wheat got wet than in a low broad pile. Rajesh handed his account sheet to the Sanjay to hold for him, and Sanjay showed it to us. The average harvester earned four sheaves.

The sun set at 6:45 and the women were still piling sheaves. A young Chamar Leatherworker man, Raj Bir, arrived to help his mother. She could still cut wheat but was too old to carry sheaves. Rajesh asked him to help pile the sheaves, but he refused. Rajesh must have been tired. As a high-caste man, he clearly regarded the low-caste man's refusal as insolence. He cracked. He slapped Raj Bir with his open hand, aiming at his face. Raj Bir appeared to catch most of the force of the blow on his arms so that his face was not slapped, or at least was not hit hard. Rajesh was visibly angry, but the young Chamar was furious. However, he made no effort to fight back, and Rajesh did not press the attack. The violence had been useless; Raj Bir still refused to stack the sheaves. Sanjay said, "It is always this way with the laborers. They cheat and there are fights."

Rajesh's mother arrived and Raj Bir's mother complained to her about the slap. She asked her son if he had slapped Raj Bir. He said that he had tried but had not succeeded. She concluded that if her son had struck Raj Bir, it was because he had done something to deserve it. Rajesh told Raj Bir's mother to go away or he would hit her son some more.

A Brahman man arrived, looked over the situation, and opined "These days there are always fights." Obviously he was not surprised and took the dustup as a matter of course. He was probably right. We recorded a dispute between Brahmans and Chamar Leatherworkers. A Brahman farmer's grandson and one of the youngster's cousins were working with a tractor in the fields. A Leatherworker woman was there pulling up plants. Both the young men hit her. The Chamars went to the pradhan

and said that they were going to the police station to file a report. The pradhan replied that the offenders were only boys. He said that he would scold the boys and that it would not happen again. He agreed that pulling up plants was not a cause for hitting. We think that the few disputes of this nature that we heard of or saw were only the tip of the iceberg. A cousin of the pradhan said that Chamar women were always pulling up plants. Some farmers are patient but others get angry, and a fight starts.

The Brahman man denied that anyone would stay in the fields to guard the stacks of sheaves, but that during the night someone would walk around and check them. However, we are quite sure that someone would sleep at the tubewell to guard it and also the stacks, since both stacks were visible from the tubewell. The Brahman pointed out that there would be a guard when the sheaves were brought to the thresher, for at that time there was danger that an enemy or a jealous person might set them on fire.

It was about 7:00 p.m. and almost dark. All the sheaves had been piled. Rajesh, Sanjay, the Brahman and one or two other young men went to the tubewell. They all lit biris (country cigarettes), checked the tubewell, locked it, and everyone walked back to the village. On the way, Sanjay observed that if Rajesh had done any real harm to Raj Bir, then the pradhan, a Jat, would have become involved. He would have gone to Rajesh and told him not to behave like that any more.

The pradhan's policy of resolving relatively minor disputes with a scolding is typical of the way problems are handled in the village. The idea is to give a person with a legitimate complaint some satisfaction, while at the same time settling matters with the least possible fuss so that village life can proceed smoothly. People have to continue to live together. The police should be kept out of village affairs as much as possible. We arrived home at 7:15.

Wheat was threshed at night to avoid the daytime heat, which was already punishing in April. On April 13, for example, the temperature was already 38.7°C (101.7°F). We wrote in our notes, "The sun is murder from 8:00 a.m. to 5:00 p.m. The evenings are warm, but it cools off later and the mornings before sunrise are fresh. How we managed to live here through the hot season 20 years ago [which begins in mid-May] we will never understand. Thank God for electricity, the fan, and the refrigerator."

A Brahman farmer showed us his threshing setup. The thresher was right beside his tubewell and powered by the tubewell motor, connected to the thresher by a long wide leather belt. A light was mounted on an electric pole beside the tubewell. His machine, which cost Rs. 1300, could thresh 12 quintals of wheat in a night, and it was not the biggest or best. There were many models that sold for different prices. Proud of his efficient operation, he remarked that farmers could now do their work while sitting, a bit of an exaggeration but the point was well taken. The hard work of farming had been greatly reduced.

The farmer pointed out an important detail of the thresher. There was one opening for feeding whole stalks of wheat into the thresher and another for just the ears. When stalks are run through the thresher, they are cut into chaff. However, some whole stalks have to be saved in order to construct a protected housing (*boonga*) for the outdoor storage of chaff. He showed us his pile of chaff. Farmers used *boongas* when they had inadequate space in their houses. Also, houses can leak and there is danger



FIG. 53. Woman and child loading sheaves onto a trolley.

that rain could ruin chaff if it is kept in the house. The farmer claimed that *boongas* did not leak. He showed us a handful of chaff so that we could see how dry it was.

Other *boongas* that we saw were generally similar, except that daincha stalks and reeds instead of twigs were used at the base of the stack. Behind the daincha and reed stalks of one *boonga* that we examined were stalks of wheat which prevented chaff from escaping through slits. A heavy grass rope was coiled around the *boonga* and a light rope passing back and forth between the coils of the heavy rope helped to keep them in position and provided additional support to the wheat stalks. The light rope made a pleasing triangular pattern on the wall of the *boonga*. It was surmounted by a pointed straw top. One completed *boonga* was quite tall. A ladder was leaning against it.

Threshing begins when the sheaves of wheat stacked in the fields are dry enough to be moved to the threshing ground, usually adjacent to a tubewell. The sheaves are loaded into a trolley, and a tractor pulls it to the thresher (fig. 53). The cart is positioned so that a man can stand on it and conveniently feed sheaves into the thresher (fig. 54). On Thursday, April 13, at 5:00 p.m., we headed to the fields to watch the threshing. The first setup that we encountered belonged to Reformer, a progressive Jat farmer. His threshing floor was near his wheat field, which simplified moving sheaves to his thresher. He was driving iron pegs into the ground to anchor the



FIG. 54. Man standing on a trolley feeds sheaves of wheat into a thresher.

thresher. His son, Tara Chand, was positioning his tractor so that it could power the thresher by means of a belt. The tractor's wheels were braced with bricks. A cloth was tied to the thresher and spread on the ground to catch the wheat. No cloth was spread for the chaff, which was allowed to collect on the ground.

Reformer's wife, son, grown daughter, and five children were working on the threshing floor. Children and Reformer's wife carried sheaves of wheat to the trolley and loaded it. Tara Chand stood on the trolley and fed the sheaves into the thresher. Reformer said that his thresher could clean 2 quintals of wheat in an hour. Reformer's wife sat on the ground beside the growing pile of wheat and picked out bits of chaff that came through the thresher with the wheat. We asked if the wheat would have to be winnowed. Reformer replied that laborers at the market would clean it. He showed us a handful of wheat. We asked what determined its price; he replied that its color and the extent to which it was free of other seeds. The seeds of weeds mixed with wheat can be a serious problem, as we shall see below. The thresher made a great deal of noise and it was difficult to talk.

The next day, Friday, we walked past Reformer's threshing floor. All the wheat had been threshed and was packed in burlap bags, the kind used for fertilizer. Tara Chand chanced by and said that the workers had finished by 10:00 p.m., that is, in about four-and-a-half hours. The wheat field measured 2 bighas. Reformer told us that his thresher could clean 2 quintals (5 maunds) of wheat per hour, and so the yield from this field was about 11 maunds per bigha, which conforms well with the figures people gave us for the normal yield of wheat. We asked about the problem of unwanted seeds in the wheat, and Tara Chand replied that the thresher was equipped with three sieves and an agitator that strain out the seeds of weeds. Tara Chand said

that his family has another wheat field east of the village. The wheat from the two fields would be combined and taken to market in a trolley.

We continued our walk on Thursday, and next encountered another Jat farmer watching his two wives, daughter, and another woman harvesting wheat. Although his older wife had a bad leg and was quite crippled, the man made no effort to assist the women. As we have frequently noted, women and children do much of the hard, tedious agricultural work. Mechanization has been a boon more for men than for women, but women have also benefited. Most hand winnowing with a winnowing tray, for example, always women's work, has been greatly reduced by threshers. If wheat sent to the market has to be cleaned, laborers do it. When it was almost dark and we were returning to the village, we passed the Jat's older crippled wife. She was limping along and seemed to be suffering. No one helped her.

A few minutes after watching the family of Jat harvesters, we saw a Brahman farmer, Mahabir Singh, and his son resting in their little hut. We joined them. He took us on a tour of his fields. First, he showed us a field of vegetables, then one of clover (berseem), and finally we came to one of his two wheat fields, one with desi wheat and the other planted in *hira moti*, one of the dwarf varieties. The stalks were very short. He expected to harvest 10 or 11 maunds of *hira moti* per bigha. We asked him which wheat he ate, expecting him to reply that he ate the desi wheat and sold the dwarf wheat. Surprisingly, he replied that all the wheat was for home consumption because he had only a little land. In his case, the better taste of desi wheat was partially trumped by the superior yield of dwarf wheat.

Our last stop for the day was at Sohan Lal's tubewell where another Jat, Dharam Singh, was threshing his wheat. Mahabir Singh accompanied us. The thresher was powered by a belt from the tubewell. A man standing on a stool fed sheaves into the thresher, which could clean 2 quintals of wheat in a hour. Once he fell off the stool. A young woman handed him sheaves which were stacked on the ground. A number of children were carrying the sheaves from the stack to the thresher.

We all examined the wheat that was coming out of the thresher. It was full of the most horrible looking weed seeds, almost as many as there were grains of wheat. The thresher did not have sieves and an agitator to winnow out weed seeds. Mahabir Singh identified the weeds. There were three: *chatri-matri*, *Vicia sativa* "Abundantly found as a weed of cultivation in fields of sarson [mustard], wheat, etc. . . ."; *murela*, *Momordica dioica*; and *bhankhri*, possibly *bhankdi*, although the latter grows during the rainy season (Maheshwari, 1976: 91, 127 (quotation), 169).

Sanjay, one of Dharam Singh's sons, explained what had happened:

I experimented and used more fertilizer than the specifications called for hoping to get a high yield. However, the weeds grew. I also used dung fertilizer instead of [or in addition to] commercial fertilizer. I should have used a herbicide to kill the weeds but I did not. However, the wheat can be cleaned in the market. They use a metal sieve to separate the wheat from the weeds.

We suggested that he would not repeat the experiment, but he said that he would because he got a high yield. He will just be careful to use a herbicide the next time.

We returned to Dharam Singh's thresher the following day, Friday. The temperature had risen to 40.2°C (104.4°F). We noticed the *loo* (a hot wind) for the first time, but were told that it had been blowing for a fortnight. The thresher was not operating because the electricity had been turned off. Periods during the day without electricity were common in the region. Dharam Singh's sons planned to set up a thresher in the middle of a field and power it with a tractor. They were working at this while we watched, but sometime later when we passed the field on the way home, the machines had not been connected and everyone had left the field.

We again inspected the wheat that had come out of the thresher, and it really looked dirty. It seemed that more than 50% of it consisted of foreign matter. A child showed us some wheat that had been cleaned with a winnowing basket. It was much improved but still had plenty of unwanted seeds. The child said that the wheat would be further cleaned with a sieve that would remove all the weed seeds. Most of the remaining seeds were small and would fall through a sieve while the wheat remained in it.

The next day, Saturday, at 5:00 p.m., we went back to Dharam Singh's thresher. He was there with two sons and two daughters. The wheat still had many weed seeds in it. They showed us how wheat is cleaned using only the blower of the thresher. A worker pours wheat slowly into the thresher while another worker tries to sweep chaff off the growing pile of wheat under it. The procedure was not very efficient.

Dharam Singh complained that village Harijans had harvested his wheat and had cut weeds along with it. He said that the dirty wheat would be used for home consumption and for feeding to cattle. Some wheat had been packed into about 8 or 10 burlap bags that had once contained 50 kg of fertilizer. This was probably the wheat for home consumption. As for the bulk of his wheat—and Dharam Singh was a big grower with 25 acres in wheat—he would probably do what other farmers were doing. He would send his wheat to market and have it cleaned there.

Pandit Mahabir Singh happened by and, after examining the wheat, asked—with tongue in cheek—"Is it wheat?" Dharam Singh said that his sons had made a mistake. They could have borrowed a sprayer from the Block Development Office and sprayed a herbicide on the field. Then there would have been no problem. He claimed never to use fertilizer, by which he probably meant factory fertilizer. He said that it brings heat into the soil and adversely affects the wheat. He complained that his sons had bought 15 bags of fertilizer and had spoiled the wheat. He had spent a lot of money for fertilizer and the wheat would not sell for even Rs. 103 per quintal in the market. The price at the time was about Rs. 110.

Mahabir Singh continued Dharam Singh's criticism of factory fertilizers. "In the old days, everything was *desi* [indigenous, Indian]. If someone was sick he could still work. Now they have to go to a dispensary. It is due to factory fertilizers. Doctors cannot diagnose diseases these days. There is a lot of medical aid available, but still the diseases cannot be diagnosed." He also noted that *desi* wheat could be preserved for a long time but not the dwarf varieties.

Pandit Chandra Bhan arrived to work on the thresher. He was the only adult Brahman man whom we knew who worked as a laborer for a Jat landowner. He was uneducated and, in 1958, worked as a laborer in a flour mill in Delhi. His father had

not yet divided the family land, but even when he did so, Chandra Bhan would have only 1.1 bighas. However, he also leased land or took it on contract and during the rabi season had 4 bighas in tomatoes. He was basically an entrepreneur who supplemented his income with agricultural labor during the harvest.

Chandra Bhan was the purohit—the family priest—of Dharam Singh. Chandra Bhan ate at the home of Dharam Singh on ceremonial occasions, but refused to take his food when he worked as a laborer. In the caste system, a higher-caste person does not, in general, eat the cooked food of a lower-caste person, except in special circumstances (see S. Freed, 1970). Brahmans rank above Jats. However, while working on the thresher, Chandra Bhan drank tea at 1:00 a.m. and again later in the morning. Tea falls outside the rules governing the exchange of cooked food.

Chandra Bhan was a Brahman, Dharam Singh's family priest, middle-aged, and a skillful workman. He was a person to be respected and did not hesitate to assert himself. Arriving on the scene, he complained that there was no trolley beside the thresher in which sheaves could be piled and on which he could stand. It was pointed out to him that the two daughters could carry sheaves to the thresher, but Chandra Bhan rejected the suggestion. He said that the girls would soon be taking their examinations and should be home studying. Although the girls remained at the thresher another hour or so, they did leave at sunset rather than working through the night. At one point, Chandra Bhan complained that the work was going slowly and advised Sanjay to find some laborers to clean up the area. Sanjay did so.

There was a discussion of Chandra Bhan's pay. Sanjay praised him extravagantly, declaring that he worked as a family member, that is, with full involvement. Sanjay said that he was the best laborer in the village whose work was equivalent to that of two or three other laborers. The ordinary pay for a night's work was Rs. 8 for eight hours. Dharam Singh would pay Chandra Bhan Rs. 1.25 per hour. He would probably work 12 hours and so he could earn as much as Rs. 15.

Like the legendary gunfighters of the old American West whose fame attracted challengers, Chandra Bhan's competence at the thresher had a similar effect on Sanjay. He bet that he could thresh as much wheat as Chandra Bhan, double or nothing. That is, if Sanjay failed to thresh as much wheat as Chandra Bhan, he would have to pay him double wages. They would both use the same thresher. Chandra Bhan smiled and said that Sanjay would lose. No bet was made.

Farmers try to pay laborers as little as possible, but it seemed to us that sometimes a farmer could waste time looking for bargains and in the end have to pay just about what other farmers paid. Dharam Singh wanted to bring laborers from Delhi, but Sanjay mildly disagreed. He said that they would work only eight hours and be paid Rs. 10. Sanjay said that he would find laborers who would work for Rs. 5. Dharam Singh pointed out that such laborers would eat two meals.

Nonetheless, Sanjay spent some time looking for bargains. Sanjay chanced to meet three laborers in the village and made a contract with them. The laborers, who were Biharis, agreed to work for Rs. 2 plus food. When he looked for them later, they had vanished. He complained that they probably had met villagers who told them that they were not getting the proper pay. We suggested that his offer was too low and that the Biharis knew the local rate very well. He replied that the Biharis had

good relations with Dharam Singh. At first they asked for Rs. 7, but he offered them food, milk, and biris, and so they accepted Rs. 2. The previous year, Dharam Singh had used a gang of Biharis to harvest his wheat. He had operated in the usual way, making a contract with the head of the gang for Rs. 80 per acre. That price was the minimum. Sanjay was wasting his time trying to beat the local rates for any kind of agricultural work.

Five days later, April 20, we went to Dharam Singh's thresher. The laborers had just arrived, two Biharis who were staying in a neighboring village, and Chandra Bhan. Sanjay complained that they were late. The Biharis were paid Rs. 8 plus two meals; Chandra Bhan received Rs. 1.25 per hour and no meals, but he did take tea. In effect, everyone was paid the standard rate. Pandit Mahabir Singh was there to buy some chaff. He needed labor, and so he asked about the Biharis. Sanjay said that they were no good and recommended Chandra Bhan. He told Mahabir Singh that he might be able to talk Chandra Bhan into working for Re. 1 per hour. In fact, that was likely. Chandra Bhan could take food from Mahabir Singh as they both were Brahmans. In that case, Chandra Bhan would be working for Rs. 8 plus two meals, the same rate as the Biharis.

Mahabir Singh had come to the thresher to buy some chaff. He bought 10 maunds for Rs. 50. Sanjay said that the rate might later rise to Rs. 10 per maund, but that depended on the crop of jowar. If the jowar crop was good, the rate for chaff would be low. Dharam Singh needed only 100 maunds of chaff for home consumption. He sold the rest. Sanjay was satisfied with his bargain with Mahabir Singh. He did not weigh the chaff; he only estimated the weight of 10 maunds. Even if the chaff weighed a little more than 10 maunds, he had saved a lot of labor by not having to weigh it. Mahabir Singh immediately took a pitchfork and moved the chaff out of the way of the thresher.

Mustard was planted in rows in wheat fields and was cut when the wheat was harvested. It is either threshed by hand or fed into a thresher. On April 18, we watched two Brahman women threshing mustard. They were working on a large cloth called a *dari*, which was also used in marriages as a rug on which people sat. One woman held the stems of the plants while the other beat the leafy tops to dislodge the seeds (fig. 55). The seed would be taken to an oil press in Narela. A farmer told us that one maund of mustard yielded 10 kg of oil. This family usually used mustard oil for home consumption. The dried stems would be used for fuel. We commented that threshing mustard was hard work; they replied that all agricultural work was hard.

A cousin of the women arrived and decided to use the thresher for the mustard. Cloths were put under the thresher. The cousin stood on a wooden platform to feed the mustard into the thresher. One of the women handed him the plants while the other, who had the most difficult job, fetched them from the fields. After a while, they examined the mustard seeds under the thresher. Many had been cut and ruined. The cousin said that had the seeds been dry they would not have been cut. The seeds and chaff were swept up. Mixed with other fodder, they would be fed to cattle.

Mustard was also threshed by using an inverted basket, as was done with rice. On March 24, while we were busy covering the festival of Holi, we passed a man and an old woman threshing mustard. We stopped to watch. The plants were arranged in a circle around the threshing floor, just as sheaves of wheat were arranged in 1958.



FIG. 55. Brahman women threshing mustard with a stick. A tubewell and thresher for wheat are in the background. The thresher is powered by the tubewell. A heavy wide leather belt will connect the shaft of the tubewell motor, which extends beyond the wall of the building, to the thresher.

In the center of the circle, a basket was placed upside down. The man and woman beat sheaves of mustard over the basket, and the small black mustard seeds were dislodged and fell to the ground. The woman indicated by hand gestures that the mustard would then be winnowed. This activity was taking place very early in the harvesting and threshing season, in fact, about a week before the first of April, after which date harvesting began in earnest. At the time, we were rushing between the Jat Holi pyre and the Brahman pyre to observe ceremonial activity and could not take time to interview the couple.

After threshing the mustard, the two Brahman women decided to thresh some wheat to be used for home consumption. They explained that the supply of wheat at home had been exhausted and it was senseless to buy wheat in the market when they had wheat in the fields. The wheat was very clean—we saw no foreign seeds at all. We asked the husband of one of the women, who had just arrived, how they had managed to have such clean wheat, and he said that “it was God’s will.” Probably the chief reason for the clean wheat was that the thresher was outfitted with a sieve. Our informant noted that they had used no herbicide but had carefully followed specifications with regard to fertilizer and irrigation.

By this time, the head of this Brahman family—whom we have called Adjudicator because he was an able politician, skilled at finding solutions to difficult social and familial problems—had arrived at the thresher. He said that this year he would sell his mustard oil because he had enough of it left from the preceding year. Besides, he did not expect much mustard for the current year because it had been attacked by an insect, *al*, which we have not been able to identify. He commented that oil from the previous year was very pure because the impurities had a chance to settle. He used it only to cook *pakor*as, vegetables wrapped in meal and deep fried.

In addition to his wheat field close to his tubewell, he had another field at some distance. He had to hire a trolley at Rs. 20 per trolleyload to transport wheat from that field to his thresher. Bullock carts can also be used to move wheat from the fields to the thresher. One farmer told us that if the wheat had to be moved 1 mile, the charge per trolley was Rs. 25. If a bullock cart was used, the charge was Rs. 6 for the same distance. A bullock cart held 250 sheaves; 1000 sheaves could be loaded into a trolley.

While the Brahmans were threshing wheat, a Jat man and his small son arrived, followed a few moments later by a woman of his household. It was about 6:00 p.m. and the Jats were probably due to use the thresher at about that time. The Brahmans were still at work on the thresher at 6:25 p.m., and they began to rush to get out of the way of the Jats. Adjudicator charged Rs. 2 for threshing a maund of wheat, which two other farmers said was the usual charge.

The cost of electricity for operating a tubewell was a significant expense. We were sitting with Adjudicator one day when he received the bill for his tubewell electricity for November, 1977. The total was Rs. 81.80. Tubewell electricity was paid monthly in Narela. Household electricity was billed separately. His tubewell had a motor of 7.5 horsepower and a four-inch pipe. Electricity was billed by the "unit" (probably a kilowatt-hour). Adjudicator had used 380 units. A unit cost 20 paise, with a surcharge of 1 paise per unit and a meter charge of Rs. 2.

Tubewell owners recovered their expenses, and more, by selling water and threshing services. Adjudicator's tubewell was profitable. He sold water to two farmers, a Jat and a Bairagi, and he exchanged water for plowing services with his cousin, thus avoiding a cost of Rs. 25 per acre. He charged Rs. 2.50 per hour for pumping water. His tubewell could irrigate an acre in five to six hours. He said that his own irrigation expenses, mainly the electricity for running the tubewell, were covered by the revenue from the sale of water. More electricity was needed for threshing than for irrigation. He was not explicit on the point, but we assume that his revenue from renting out his thresher was enough to cover his own threshing expenses. Before he had his own tubewell, he had to buy water from another farmer's tubewell and also thresh his wheat there.

Farmers generally did not consider family labor as an expense. When a tubewell was running, a family member had to be in attendance in case the motor overheated. We went with Adjudicator to his tubewell one day when he had arranged to irrigate a field for the Bairagi. We accompanied the Bairagi to his field to watch the water arrive. He had to clean some grass out of the irrigation ditch. Two young men were there watching but made no effort to help. We then returned to the tubewell. Adjudicator had turned off the motor to grease a bearing because the motor was running

hot. Additional time could be lost when electricity was turned off in the region, sometimes for several hours.

Just a few days before we left Shanti Nagar for the last time on April 30, we went to the fields in search of the pradhan. We found him at his thresher, a large first-class machine. The thresher had an agitator and strainer attachment, and the wheat came out through a trough rather than just falling to the ground. He pointed out that his wheat came from the thresher free of chaff and that the seeds of weeds were strained out. He said that it could clean about 40 quintals of wheat in a night. If the grain was dry enough, it could thresh more than that. It would take bullocks 15 to 20 days to thresh 40 quintals. The smaller machines cleaned only 12 quintals. The figures mentioned by different farmers for the production of threshers vary considerably from informant to informant, which reflects the various kinds of machines in use and also the particular circumstances of the different farmers. The Jat farmer who claimed to have the largest thresher in the village said that it could clean 8 quintals per hour, or roughly 64 during a night. One Jat farmer said that the big machines could clean 10 quintals per hour, about 80 per night. The pradhan needed a powerful thresher. His family had the largest farm in the village, 60 acres, of which 52 were in wheat.

Wheat earmarked for home consumption was stored in farmers' houses either in large metal drums of various sizes—holding from 5 to 60 or 70 maunds—or in heavy upright burlap bags (*teka*). In either case, a pesticide—the trade name was gamaxine—had to be added to prevent an infestation of worms. A metal drum that held 10 maunds of wheat cost Rs. 40. Two bottles of gamaxine, which cost Rs. 4 per bottle, were needed for a drum. The drum was kept closed for a week. The pesticide emitted a gas which killed the worms. We assume that the treatment had to be repeated if worms were subsequently discovered.

We became aware of the problem of worms when, in mid- January, we noticed two women cleaning wheat in the street with winnowing baskets. We stopped to watch one woman, and she called our attention to the worms. There was a hole in every single grain, and we could see a worm in most of them. She explained that when wheat is stored for too long in the same place, it can become infested with worms. This wheat was probably from the preceding harvest, that is, April, and so it had been stored for about 9 or 10 months. She said that the damaged wheat would be fed to cattle. An advantage of desi wheat over dwarf wheat is that it is harder and is not so vulnerable to infestation.

Wheat and chaff not needed for the household were sold either in the village or in the market. By buying and selling in the village, villagers saved cartage and a broker's commission. The big growers generally sent their wheat to market as it was threshed. Speed could be important. Reformer, a very sharp progressive farmer, said that he used a combine to harvest and thresh his wheat quickly. If the weather turned bad and there was some rain, then harvesting and threshing were slow. If he could send his wheat to market at the beginning of the season, the rate might be good, perhaps Rs. 125–130 per quintal. But later in April, wheat would flood into the market and the price would decline. Prices were lowest just after the harvest; then they would slowly rise. Be that as it may, in 1978, Reformer used his own thresher to harvest his field close to the village. However, he was said to have used a combine in

distant fields. He combined the wheat from the two locations and sent it to market in a trolley. He was selling at the rate of Rs. 110 per quintal like other farmers. Smaller growers with plenty of room in the house might keep their surplus wheat for a while after the harvest until prices began to rise. Adjudicator said that he followed this strategy.

Adjudicator outlined how he handled his wheat in 1977. He usually harvested about 120 maunds; in his best year, he harvested 170 maunds. He needed 60 maunds for home consumption, 40 maunds for people and about 20 for cattle. That left about 60 maunds for sale. Adjudicator sold 20 maunds (8 quintals) at Narela for Rs. 122 per quintal. The village price was set by the price in the Narela market, with adjustments. A vendor preferred to sell in the village to avoid cartage costs and the agent's commission and also because prices were higher. A buyer paid a price higher than the market rate because he too saved cartage costs—Rs. 2.50 per quintal. Adjudicator sold 30 maunds (12 quintals) in the village, most of it at Rs. 125 but 2 quintals brought Rs. 127. This was *desi* wheat, as indicated by the price. The weight figures are approximations and do not quite add up. He kept *desi* wheat—890 was his favorite—for home consumption. He fed wheat 1553, one of the high-yielding varieties, to his cattle. The wheat sent for sale in the market was both *desi* wheat (Ludhiana) and 1553. Probably most of it was *desi* wheat, which would account for the high price he quoted.



FIG. 56. Sohan Lal's partially dismantled chaff pile.

He had six customers: three Brahmans, who were members of his own lineage, a Gardener, a Barber, and a Sweeper, the last three either with no land or none available for wheat. The three Brahmans had only 4.5 bighas each, only 3 of which were in wheat. They could not grow enough wheat for their families. Although it is possible that village customers were willing to pay more than the market price because they saved cartage expenses, there may have been another, or additional, reason. Adjudicator waited a month or two for payment. In effect, he sold on credit. In 1958 when wheat was bought on credit, vendors sometimes charged some Rs. 2 above the market price. A similar custom was probably in effect in 1978. Adjudicator disclaimed charging interest. He held to the belief that one should not take interest from a Sweeper, a Barber, or a Washerman. He might also have been reluctant to ask members of his lineage for interest. However, the difference between the village price and the market price could have been partly a disguised interest payment. There was a Fair Price Shop in the village, but Adjudicator claimed that usually only people who could not buy their wheat for the entire year used it.

Wheat was shipped to Narela in tractor-drawn trolleys. A four-wheeled trolley could hold up to 80 maunds; a two-wheeler, only 60 to 65 maunds. The trolley owner charged Re. 1 per maund. Potters also took wheat to Narela in their carts (*tonga*), charging Re. 1 per maund. One Potter described his hauling business. He owned two carts and one mule. The mule cost Rs. 5000 and could work for 20 years, if there was no disease. It cost Rs. 20 per day to feed a mule. One of his carts had inflated tires and cost Rs. 2500; the other cart had solid rubber tires and cost Rs. 1000. The more expensive cart hauled heavier cargo, such as wheat. It could handle 50 maunds. The other cart was for lighter loads. He used it during the rabi season to take baskets of tomatoes to the vegetable market. Maintenance for a cart was about Rs. 1200 per year. The Potter paid a license fee of Rs. 150 per cart. To enter the market, he paid 25 paise.

He not only carried wheat from the village to the market, but also he brought wheat back from the market. In such cases, landless villagers might have been laying in their supply of wheat for the year, and some farmers who grew dwarf wheat for sale purchased desi wheat in the market for home consumption. Also, villagers often asked him to purchase items for them in Narela and bring them back on his return trip.

The Potter worked with his carts throughout the year. Although he did not have much business during the *chaumasa*, a four-month period from about June 15 to October 15 that includes the monsoon season, he kept his mule anyway rather than selling it to avoid feeding expenses and then buying another mule when business picked up. He earned good money in both the tomato and wheat seasons, especially if he could make two trips per day. However, during the wheat season, he usually made only one trip. He did not mention competition from trolleys, probably because their charges were the same as his. However, he was losing some business to *tempos*—small trucks like pickup trucks—because they transported wheat to market for only Rs. 2 per quintal whereas his rate was Rs. 2.50 (Re. 1 per maund). They also charged less for hauling tomatoes, 40 paise for a small basket, where his price was 50 paise. However, he still managed to do well despite the *tempos*, and planned to buy his son a cart and mule if the young man could not find a job after finishing his education.

After the wheat arrived in the market, a commission agent auctioned it to businessmen. He received a commission of 5%. During the harvest, wheat was selling at Rs. 110–115 per quintal. The government support price³² was Rs. 112.50, but the effective price was set by the buyers in the auction.

Chaff was either sold in the village or shipped by truck to Delhi for sale. A reasonably well-informed farmer told us that the biggest grower in the village hired a truck for Rs. 100–125 to take chaff to Delhi. A truck could haul 100–125 maunds of chaff. During the harvest, chaff sold for as little as Rs. 5 per maund in the village, and people who anticipated that they would need chaff tried to buy it then. On April 27, we were sitting with a Jat farmer when two boys from a neighboring village approached and asked who might have some chaff for sale. It was near the end of the harvest season and the last chance to find a bargain. After a farmer filled a *boonga* with enough chaff for his own needs, he would sell the surplus if any. The boys were not having much luck. In February–March, chaff was selling for Rs. 10 per maund (Rs. 25 a quintal) because it was generally unavailable then. A farmer said that he had bought 10 quintals for Rs. 250 and borrowed another 5 or 6 quintals from another farmer. After the harvest started, he paid back the loan.

In 1958, we noted that some farmers liked to speculate in fodder by buying and selling *boongas*. We assume that such was also the case in 1978. Because of how they were constructed, *boongas* would have to be sold as whole units. If half a *boonga* were sold, the farmer would have to find a way to store the remaining chaff or to sell it quickly. In mid-November we saw a *boonga* that seemed to have collapsed. The owner, Sohan Lal, was nearby, and we asked him about it. He said that it had not collapsed. He had sold the *boonga* to a man from another village who turned out to be a cheat. The buyer removed one truckload of chaff and then did not pay (fig. 56). Sohan Lal was furious. He went to the Narela market, probably with his son, Rajesh, found the man and brought him to Shanti Nagar, where they kept him for two days. Then they took him to the man's brothers. They said that their brother had a bad character and did such things. The brothers discussed the situation and decided to pay Sohan Lal for the one truckload of chaff that their brother had taken. Sohan Lal would try to find another buyer for the balance. Sohan Lal realistically commented that in such a transaction one deals on faith, and that some people are dishonest.

Two months later, Rajesh provided additional details, but he omitted the dramatic account of the alleged "kidnapping". He said, "The *boonga* was sold for Rs. 2400, but the buyer could not pay. He took half the chaff, sold that, saw that he would lose money, and did not come for the rest of it. My father agreed to accept payment for half the chaff, but when the buyer was found he had only Rs. 400. The man's brothers guaranteed the balance." Rajesh said that afterwards buyers came and wanted to buy small amounts of chaff, but that he and his father wanted to sell the rest of it all at once and not little by little. He said that it had taken five men several days to build the stack.

In the morning of April 28, we went to the *pradhan's* home. He had gone to Delhi in search of a combine. He still had about 13 acres left to harvest. It was the end of the season and he was in a hurry. A trolley loaded with 80 maunds of wheat 1553, a high-yielding variety, was parked in front of his house. The *pradhan's* uncle, Dharam

Singh, was there. He said that the yield was averaging about 8 maunds per bigha—9 or 10 maunds from the best land and 5 or 6 maunds from the poorer land. The temperature that day was 40°C (104°F). Two days later, we left for Delhi on our way to New York. The really hot weather was just over the horizon, and Ruth had to be back in New York to prepare her courses for the fall semester.

BARLEY

The acreage devoted to barley during the 1970s, an average of 79 bighas or 16.5 acres, was very much less than the average wheat acreage, but barley was nonetheless the second most widely grown rabi crop. Its acreage declined to only 9 acres in 1977; however, it still retained its second-place rank. Barley was so overshadowed by wheat that we collected little information about it, although it did come to our attention from time to time, usually because of its use in ceremonies. In the course of an interview about threshing wheat, one Jat farmer with a large farm mentioned barley in an agricultural context, the only farmer to do so. Barley was harvested at the same time as wheat, and the threshing of the two grains was probably similar. This farmer had 10.5 acres in wheat and 2.5 acres in barley, which amounted to 28% of the village crop. That is probably the reason that he had barley on his mind. The acreage devoted to barley in 1958 was almost the same as in 1977, 7 acres.

Although the farmer knew that barley was used commercially to make beer, he apparently grew it mainly for home consumption. He mixed some of it with chickpeas and fed the mixture to cattle. His wife used it to prepare a dish called *daliya*. Barley is soaked until the skin comes off and then mixed with rice. The mixture is pounded and sugar is added. It was eaten with yoghurt or buttermilk in the morning or with butter at night. The word *daliya* referred not only to this dish but to any cracked grain.

CLOVER (BERSEEM) AND OATS

We do not remember seeing clover (berseem) in the fields in 1958, and none is mentioned in the crop chart. However, in the 1970s, it was an important fodder crop, the third most important rabi crop in terms of the area planted (an average of 12 acres). When walking in the fields in the winter, we often saw people, almost always girls or women, harvesting clover. It was planted in October and kept growing back after a cutting, so that it could be harvested all winter and spring. It lasted until the end of May. Growth diminished considerably during the cold weather, but it picked up again in the spring. On March 23, we noticed that berseem was lush and quite tall in several fields. In mid-April, berseem flowered. Some farmers might set aside part of a field where the plants would be allowed to mature. The seeds would be collected and planted the following year.

The seed was broadcast on damp soil and sank down into it, so that there were no plowing, sowing, or weeding expenses. Clover was fertilized with manure. It had to be irrigated every 15 days, which was the only cash expense other than seed. From 2 to 5 kg of seed were used for an acre at a cost of Rs. 10 per kilogram. There is a

weed that always grows in fields of clover and inhibits its growth. The seeds of this weed and those of clover are so similar that it is difficult to separate them.

Clover cultivation was a family operation, and the fodder was used for the family cattle. However, a farmer might sell a field of clover, leaving the harvesting to the purchaser. Enclosed fields were rare in Shanti Nagar, but we noticed two walled fields of clover adjoining the village. The wall was probably necessary to protect the clover from wandering cattle.

Oats, considered unfit for human consumption, were grown for fodder during the rabi season, just as was clover. When asked which was the better fodder, one farmer unhesitatingly chose clover, but another man offered a more nuanced evaluation. He said, "[C]lover is just filling but oats give strength to the cattle." However, the acreage figures make the relative merits of clover and oats clear. During the 1970s, clover was grown on 56 bighas per year, on the average, whereas oats were almost invisible in the crop chart, having been grown on a total of only 3 bighas during the 1970s. Clover was clearly superior to oats as a fodder crop, possibly because it could be harvested all through the winter and spring. Oats would regrow only once after having been cut. One farmer characterized clover as essential, which was pretty much our impression. He mixed mustard seed and a little powdered earth with clover when fed to his cattle. However, the figures in the patwari records for the acreage devoted to oats were deceptive. We saw a field of oats, although none were noted in the patwari records for 1977, and oats were often grown in a small part of a field or along its edges, thus probably escaping mention in the crop chart. Despite the patwari records, it was likely that a small acreage was steadily devoted to oats during the 1970s.

Clover is particularly suitable for cattle during the winter because it is a "hot" food. In this context, hot does not refer to the temperature of the food but to an innate quality (R. Freed and S. Freed, 1979: 290; 1993: 47). A farmer said, "In the winter season, if the animal eats berseem the cold will not affect it because [clover] is very warm and gives plenty of heat. The hot-cold classification is the same for animals as for humans. Thus, clover does not have a bad effect on cattle."

PEAS

After tomatoes, peas were the principal vegetable grown during the rabi season both in 1958–1959 and 1977–1978. In 1958, there were two varieties, one for human consumption, the other, called black peas, used for fodder. In 1978, villagers spoke only of peas (*mattar*), but they did grow black peas (*kali mattar*) because we saw some on the property of two farmers. Black peas were shredded in a fodder cutter before being fed to cattle. In 1958, peas for human consumption were grown on both irrigated land (33 bighas) and *barani* land (18 bighas); one-third of the rainfed peas failed to mature. Fodder peas were grown on an additional 69 bighas of canal-irrigated land and 23 bighas of *barani* land. There is no indication in the patwari records that any fodder peas (*mattar chara*) failed to mature. During the 1970s, peas were grown only on irrigated land, 30 bighas on the average.

The details of the costs of cultivation and the yield for both table peas and fodder peas in 1958 are given in S. Freed and R. Freed (1978: 70). Women did most of the

harvesting. They were paid less than the usual rate for day labor (Rs. 1.50) because the work was believed to be relatively easy. A farmer who chose to sell his field before it was harvested saved harvesting expenses and also a bit of the nuisance, or expense, of guarding it. Peas had to be guarded to protect them from the depredations of cattle.

In the 1970s, not much acreage was devoted to peas, although they were said to be a lucrative cash crop. One reason probably was that more money could be earned with tomatoes. The seasons of tomatoes and peas overlapped. Although tomatoes were classified as a kharif crop and peas were a rabi crop, the two vegetables could not be grown successively in a field—and people preferred tomatoes. One farmer explained that peas could be harvested for only one or two months, but tomatoes continued to yield for as long as four months. Peas had one advantage. The plants could be used for fodder, but tomato plants were either discarded or used as fuel.

In mid-January, we watched two women laborers harvesting a field of peas. Laborers who harvested peas were paid by the day rather than receiving a percentage of the crop, as was the case with wheat, for example. The Jat owner was there and explained that a man working as a laborer was paid Rs. 8 per day and his meals whereas a woman earned only Rs. 6 and no food. We remarked that women worked harder than men, and one of the women, overhearing our comment, replied sarcastically, "He is a man. You should ask him how much work he does."

The pea harvest began toward the end of December and continued through January. It was during this period that the peas had to be guarded. On December 23, we were sitting with a Jat farmer in the fields when a Chamar Leatherworker man arrived to talk about guarding the Jat's 1-acre field of peas. The Jat farmer said that the Leatherworker "was the family Chamar." This was an allusion to the jajmani system of traditional multigenerational economic relationships between a specific landowning family and a family of laborers and/or artisans (S. Freed and R. Freed, 1976: 120–131). The Chamars had dropped almost entirely from the jajmani system as purveyors of services even by 1958. In one sense, the jajmani system had been converted to a system of wage labor. Nonetheless, in the case of this Chamar and Jat, a trace of the traditional relationship remained, which made for smooth working relationships. The two men easily and quickly agreed on a contract for one month at Rs. 25 plus two meals per day. The Leatherworker promised to guard the field carefully. He would start the next day, working from sunrise to dark (about 6:00 a.m. to 7:00 p.m.).

The harvest was in full swing by mid-January, although it was eclipsed by the much larger tomato harvest. Nonetheless it was brought to our attention in various ways, as when we passed a field of peas and a young woman gave us a handful. In January 1959, a Jat farmer made an interesting observation about peas that we heard from no one else. He said, "There are two kinds of vegetables. One kind will spoil if not harvested on time. Peas, on the other hand, are both a vegetable and a crop. You can sell them as a vegetable or leave them in the field to go to seed and sell the seeds."

ADDITIONAL (Zaid) Rabi

Farmers grew various vegetables throughout the year. Although the important grains—wheat, rice, and the millets and a few vegetables such as peas—could be

cultivated only in season, some vegetables could be grown at almost any time. Even tomatoes, almost entirely a kharif crop in 1977, had once been extensively cultivated during the rabi season. Tomatoes were a major cash crop. Other vegetables and, in addition, melons, pulses, and spices were grown mainly for home consumption. The climate was favorable for their cultivation, and they increased both the enjoyment and the nutritional value of the village cuisine.

Although vegetable cultivation—aside from tomatoes—was a sideshow during the rabi and kharif seasons, it was the main event during a minor season—in terms of cultivated area—known as additional, or *zaid* rabi. During this season, villagers grew what a Brahman farmer called the summer vegetables and melons. Additional rabi began after the rabi season. Summer vegetables could be grown either in wheat or tomato fields after the harvest. In 1958, *zaid* rabi probably followed wheat more often than tomatoes because at that time relatively few fields were planted in tomatoes. In 1978 on the other hand, all the *zaid* rabi vegetables that we noted were grown in fields left vacant after the tomato harvest. In this regard, tomatoes had an advantage over wheat. They were out of a field generally by mid-February whereas the wheat harvest continued through April.

The village crop charts are unreliable guides to vegetable cultivation, probably because so many different vegetables were grown but in small quantities and largely for home consumption. The crop chart for 1958 lists fewer than 10 vegetables covering only 8 acres. Vegetable marrow (*ghia*) and a kind of squash or cucumber (*tindi* or *tinda*) accounted for over half the acreage. In the 1970s, an additional rabi season was recorded for only two years, 1971 and 1974. In 1971, 44 acres of vegetables were grown during *zaid* rabi with vegetable marrow and a squash at the top of the list. The village patwari effectively abandoned the effort of compiling a detailed list, lumping over half of the vegetable acreage under the heading of “other vegetables”. The *zaid* rabi chart for 1974 was quite sparse, listing only four vegetables grown on 6 acres. However, this figure gives little idea of the scope of vegetable cultivation. The crop chart for the rabi season for the three years from 1975 to 1977 notes an average of 58 acres under “vegetables”. We have no basis for speculating about the identity of these vegetables.

There has probably been a great expansion of vegetable cultivation in Shanti Nagar and the surrounding area since the 1920s and especially after Independence. During the decade 1915–1925 in the village of Gijhi, Rohtak District, about 15 miles northwest of Shanti Nagar, an average of only one-half acre per year was under vegetables (Narain and Narain, 1932: 193). This figure and those from Shanti Nagar suggest perhaps a hundredfold increase, tomatoes excluded.

With limited time in Shanti Nagar, we had to concentrate on the most important crops, the cereals and tomatoes, and could spend little time on vegetables grown on small plots mainly for household use. However, when we did pass a field of vegetables where people were working, we stopped to ask a few questions and take notes. For example, on April 8 during the late afternoon when we were watching Rajesh, the son of Sohan Lal, paying his harvesters, a number of people were transplanting eggplant into one of Sohan Lal's fields that adjoined his wheat fields. Tomatoes had probably preceeded the eggplants because Sohan Lal's wheat harvest, at least in this area, had ended only that day. Tomatoes would have been cleared from the field in

plenty of time for it to have been prepared for one of the vegetables, eggplant in this case, of the additional rabi season.

A Brahman farmer said that some of the eggplant would be ready for harvest in a month. From then on, it would be picked daily or every few days like tomatoes. It is a four-month crop. It stayed in the fields too long to be followed by the kharif millets. Instead, the field could be left fallow and planted in wheat or tomatoes in the fall. The Brahman remarked that eggplant could be sold in the Delhi vegetable market just like tomatoes. The villagers often told us that vegetables were grown for household consumption. However, such use would in no way prevent the sale of vegetables at the urban market. In the 1950s, tomatoes were a minor crop. In the 1970s, they were second only to wheat. Other plants—eggplants, potatoes, a popular squash or melon for example—could follow a similar course.

Potatoes appeared sporadically in the village crop chart for the 1970s. They were listed for three years (1 bigha each time) during the rabi season, but only once (5 bighas) in the kharif season. The latter mention was an anomaly, for potatoes grow best in cool weather. The area devoted to potatoes was so small that we wondered why the patwari bothered to list the crop. However, he certainly overlooked a number of small potato fields. We saw potatoes being planted in two fields. On both occasions, we were interested in something else and just spotted the potato fields in passing. Had we made an effort to find more fields, we probably would have found several. Both fields were sown in the fall, which meant that potatoes were a rabi crop.

Maheshwari noted that two cultivars were grown in the Delhi region:

[Potatoes are] cultivated during the cold season for [their] edible, underground tubers. Cultivar "Gola" of Meerut and "Phulwa" of Farrukhabad are commonly grown in Delhi. The former is earlier but the latter is a very heavy yielder. Two crops can be sown, one in September or earlier and the other in January or earlier, so that the tubers are available in December and April. [Maheshwari, 1976: 245]

On November 19, walking on the main east-west road through the fields, we saw three young men planting potatoes in a rather deep wide ditch between the road and an adjacent field. The ditch carried off water during the rains, but later vegetables could be grown in it. The men had made two ridges of soil and the potatoes were sown in the ridges about 9 to 12 inches apart. Small whole potatoes were planted about 2 inches deep. Two men used trowels to make the hole, but the third man did not have one and simply forced the potatoes into the soil. Larger potatoes could be cut into pieces for seed. They said that the potatoes would be ripe in about three-and-a-half months. One of the men suddenly ran to the area where his family made dungcakes to chase away a water buffalo that was eating some plants. He said that wandering buffalos were a big problem. Four months later we returned to the ditch to see what had happened to the potatoes. None were visible. The area looked as if it had recently been dug up.

About a month earlier we were sitting at the edge of a field in which Brahman women were planting various vegetables, radishes, carrots, and potatoes. The seed potatoes in this case came from the Delhi vegetable market. The women cut up the

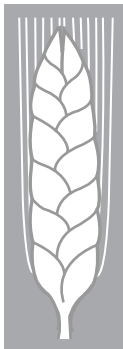
potatoes, leaving an eye in each piece. They were planted in ridges. Potatoes are in a field during the tomato season, and we asked a Brahman man sitting with us which crop he would prefer to sow if he had an empty field. He chose tomatoes, and we asked him why. He said, "Tomatoes are less expensive and, second, potatoes are dug up only once and then the season is over, while each tomato plant keeps on yielding [for several months]. Third, the wholesale rate for tomatoes in the market is always higher than that of potatoes. Those are the reasons that people have taken to tomatoes." Potatoes are a common vegetable in Indian cuisine, but commercial potato cultivation does not appear to have much of a future in Shanti Nagar because of the conflict with tomatoes. But that situation could change.

A Brahman farmer explained some of the details of potato cultivation. Because potatoes were generally for household use, they were grown on small plots that were prepared with a spade rather than being plowed. Because the plots were small, all the work could be done by family members. He claimed that no fertilizer was used, but another farmer said that potatoes required fertilizer for a high yield. The plot was irrigated. The seeds, either small potatoes or pieces of a potato with an eye, were sown deeply about 9 inches apart in ridges that were about 10 inches apart. The seed potatoes were purchased in the market for Re. 1 per kilogram. The plants began to appear after about 8 to 10 days. A potato field was irrigated three or four times, and each time, wet soil was added to the ridges to moisten the plants and to increase the size of the ridges so that the plants would have more room to grow. This farmer said that potatoes were ready for harvesting after two months. He said that each plant yielded 8 to 10 potatoes.

Summer vegetables often grown during the additional rabi season were vegetable marrow, squash (*tinda*), and a melon known as *kachera* or *kachri* in the village and *kabujer* in the city. A field was often sown with more than one kind of vegetable, probably because vegetables were grown to a considerable extent for household use and variety would be important. The summer vegetables were almost always grown after tomatoes. The crops that followed them in the crop rotation depended on several factors, such as how long a vegetable was in a field. Sometimes there was no time for a kharif crop and a field had to be left fallow until the beginning of the rabi season in the fall.

On February 21, just about a week after the end of the tomato season, we spotted an elderly Brahman farmer and his granddaughter preparing a field for squash and vegetable marrow. They had wasted no time. The tomato plants that had been in the field were still lying in piles at its edge. They were working with hoes because fields with standing crops surrounded their field and they said that neither a tractor nor bullocks could reach it to plow it. This kind of situation was one of the reasons for keeping a few bullocks in the village. They could reach fields that were inaccessible to tractors. We think that bringing bullocks into the field could have been done, but it would have been inconvenient. The farmer probably decided that it was not worth the trouble. We did not ask the area of the field, but it was probably about 1 acre, the standard size. Some of the vegetables would be earmarked for household use; the excess would be sold. *Tinda* and *ghia* ripened by June and there would still have been time for a kharif crop, but the farmer had already decided to let the field lie fallow for wheat.

A little more than a month later, we saw another Brahman farmer working in a field with a spade making ridges for irrigation. He was in the mood to sit and talk. He was wearing a headcloth, which he insisted on spreading on the ground for us to sit on. We were most reluctant but finally, and graciously we hope, accepted his offer. He was preparing a field for *zaid* rabi. First, the field was plowed twice, once in each direction. He hired a Jat farmer to do the plowing. The field was then irrigated, after which it would again be plowed two times and irrigated. Then the seed was broadcast. The field could be irrigated properly only in small sections, which was the reason that he was making ridges. His strategy was different from the above Brahman farmer. He planned to sow *tinda* and *kachri* rather than *ghia*. The *tinda* would be ripe sometime in June before the monsoon, and the melons would ripen 20 days later. He was undecided about what to do with the field after the additional rabi season, and resolved to delay his decision. Either he would plant paddy or he would let the field lie fallow for wheat. If the crop ripened as expected and there was not too much rain which would prevent the field from being plowed in time, then he would sow paddy. If it rained heavily so that the ground was too soft to be plowed, then he would leave the field for wheat.



CHAPTER FIVE

DOMESTIC ANIMALS

THE EFFECTS of the Green Revolution on crops were direct. The first phase of the Green Revolution, which was biochemical, featured new, high-yielding varieties of important grains accompanied by the factory fertilizers and tubewell irrigation that were necessary for their extensive cultivation. The second phase, which saw the introduction of power-driven equipment, most notably tractors and threshers, followed very closely on the first phase. Mechanization had its primary effect on agriculture. Work in the fields was easier and faster, and the crop cycle was compressed. Wheat could follow rice, for example, because a tractor could quickly plow a field, and chemical fertilizers would maintain its fertility without a fallow period.

The effects of the Green Revolution in animal husbandry were indirect. No new breeds of cattle appeared on the scene nor was new machinery introduced for reducing the time and effort spent in processing milk. But tractors, which were adopted for plowing, had the secondary effect of replacing bullocks, which in turn checked the growth of the cow population and also reduced the amount of dung, a commodity that was indispensable for cooking and was also an important fertilizer.

The cattle³³ population of Shanti Nagar had two components: zebu cattle and water (or domestic) buffalo (table 5). The Green Revolution changed its demographics. In 1958, the cattle population was almost equally divided between zebu cattle (200) and water buffalo (190). In 1978, water buffalo (310) far outnumbered bovine cattle (117). Tractors had made most bullocks superfluous, which in turn reduced the need for zebu cows, whose chief function was to produce bullocks. Their milk and dung were important, but the water buffalo was the better milch animal and also produced more dung. Cows held their own in absolute numbers, 47 both in 1958 and 1978, chiefly because they are sacred in Hinduism. Some families kept cows mainly for that reason. However, in the context of an increasing human population, zebu cows were in decline. On the other hand, the number of water buffalo shot up from 190 to 310.

Cattle were by far the most important domestic animals in Shanti Nagar, but there were a few others, none of which had been noticeably affected by the Green Revolution. However, horses, donkeys, and mules were potentially vulnerable as small trucks became increasingly common. Pigs showed little potential for anything other

than what they had been for decades: the province of Sweeper women who might raise a few for meat or for sale. Cats and dogs were kept as pets although a cat might be tied near a supply of grain to protect it from rats.

On the other hand, the number of chickens in the village could one day skyrocket. The raising of chickens was traditionally small-scale and, like pigs, entirely in the hands of the Sweepers. However, commercial chicken farming was a possibility because Delhi was within easy reach. Eggs could be marketed in the city much as tomatoes were in 1978.

Two Jat brothers, Ram Pal and Munshi Ram, did try their hand at commercial chicken farming just after we left the village in 1959, but lost money and gave up the enterprise (S. Freed and R. Freed, 1986). There were possible problems: Hindu vegetarianism, the low status of poultry farming, and certain beliefs about the nature of eggs. Although many Hindus are strict vegetarians who do not eat eggs, others are not so rigorous and will eat them. Ram Pal was, of course, aware of Hindu vegetarianism, but he knew that many nonvegetarians, Hindus and others, lived in Delhi and believed that he could find plenty of customers there.

Another possible problem that occurred to us, although it did not seem to bother Ram Pal in the slightest, was that raising poultry was identified with the Sweepers and therefore had little prestige. Ram Pal was a well-educated man with a good job in addition to his farm and not particularly concerned about his neighbors' opinion of his activities. It was a measure of his self-confidence and also of changing times in India that he was willing to engage in a business that was traditionally associated with one of the lower castes.

Before Ram Pal started his egg business, there were only about 20 hens and four roosters in the village, divided among 10 Sweeper families. Raised as table birds and for their eggs, chickens were relatively costly. A large one sold for about three times the daily pay of a farm laborer. Eggs were generally consumed in the village, some by high-caste individuals. Strict vegetarians frowned on the practice, so the sale of eggs was conducted surreptitiously.

Shortly after our return to the village after an absence of 20 years, we called on Ram Pal to congratulate him on the birth of his second son. He was not at home, but his brother, Munshi Ram, was there resting on a cot in a building that was once part of his poultry farm. The rooms had been converted into living quarters. We asked him why he had not purchased more chickens and stayed in the poultry and egg business. He told us what had happened:

My brother started the business just after you [the Freeds] left, but he operated in a small way with 100 or so birds. In 1964, he went to England and I took over the business. I quickly expanded to 3000 birds and continued for three years. However, in the last year, I lost Rs. 22,000 in about two or three months and sold the chickens as table birds.

No one can make money in the egg business. Indians believe that eggs are very hot and generally eat them in December and January but not at other times. Even in February, egg consumption drops very much. In my last year in the egg business, I began to lose money in February and in

a couple of months had lost Rs. 22,000. I was selling eggs for 12 paise but it cost 19 paise to feed each of the 3000 chickens every day. The hens gave about 2600 to 2700 eggs per day. The difference of 7 paise per bird per day led to my losses. I have still not recovered from that financial disaster.

The problem that ruined Munshi Ram's egg business involved the concepts of "hot" and "cold" foods, terms which refer to the quality of foods and not to their temperature. Hot foods are believed to produce heat in the body and generally are eaten during the cold season; cold foods produce coolness in the body and are more appropriate for the hot months. Indians believe that eggs are very hot and generally eat them only in December and January, the two coldest months. The brothers knew that eggs were very hot but did not foresee the problem that this belief would pose for their business. At the time, we were no wiser. If the belief in the hot-cold quality of foods were ever to attenuate, then a large-scale egg business could be profitable. Until then, it would be a risky proposition.

The Jat brothers were not the only men who had tried their hand at the chicken business. In the course of a discussion of possible side businesses with Reformer, he mentioned that a Potter man had also started a chicken business. He lost money—some Rs. 3000 to Rs. 4000—and had to sell the birds. Reformer said that chickens were not a good venture. They ate all the time, and there was also the problem of disease. People usually lost money in the chicken business. Reformer had several ideas for new enterprises. He had considered mushrooms, beekeeping, and a dairy. However, his age and his full-time employment were against such ventures. And at the time, his son was taking no interest.

BULLOCKS

Because change in the cattle population between 1958 and 1978 was triggered by the sharp decline in the number of bullocks, this development is a convenient point to begin a discussion of the effects of the Green Revolution on animal husbandry.

In 1958–1959, bullocks were used for plowing, sowing, threshing, turning sugarcane mills and Persian wheels, and drawing carts. They were owned only by cultivators. Of the 95 bullocks in the village, 3 were owned by landless families; however, these families cultivated land on shares. The various functions of bullocks did not overlap to any significant extent; for example, a farmer did no plowing during the season when he was making gur. Because plowing was the most demanding labor required of bullocks, the principal factor that determined their number was the area of the village cultivable land. According to villagers, a yoke of bullocks could adequately work a maximum of 60 bighas. In 1958, there were 2808 bighas of cultivable land.

To farm this area, in addition to the bullocks, there was a single tractor belonging to a farmer who owed 58 bighas, and a camel owned by another farmer with 210 bighas. The villagers said that one camel did the work of 1.5 bullocks. The area that had to be cultivated by bullocks was therefore 2705 bighas (2808 bighas minus 58 bighas for the tractor and 45 bighas for the camel). If the village land were farmed

TABLE 6.**CULTIVATING FAMILIES BY NUMBER OF BULLOCKS AND AVERAGE AMOUNT OF LAND CULTIVATED**

NUMBER OF FAMILIES	BULLOCKS PER FAMILY	LAND PER FAMILY (BIGHAS)
10	0	6.7
12	1	20.3
28	2	53.3
5	3	97.8
3	4	137.3

as a single large estate and all the bullocks were well and strong, the land could be cultivated with 90 bullocks. Thus, the fit of land and bullocks on a village-wide basis was very close, departing from the theoretically most efficient condition by only five bullocks, or 6%.

However, village land was not farmed as a unit; its cultivation was divided among 58 families that managed their farms independently. Of these families, 10 owned no bullocks and 12 owned only one (table 6). Therefore, they hired other farmers to plow their fields or shared their single bullock with another farmer who owned only one or who, owning three, had an odd bullock available for sharing. If each farmer had been equipped with a yoke of bullocks, and the farmers who had three bullocks acquired another one in order to have two yokes, then from the point of view of the cultivable land of the village, there would have been an excess of bullocks of about 47%. However, a farmer with a small landholding did not have to own bullocks in order to farm. He had several options, and his decision rested upon an appraisal of costs versus benefits.

Usually a farmer acquired bullocks by purchase rather than by raising them himself. The need for a bullock often arose more or less abruptly: for example, one of a farmer's bullocks died suddenly or a joint family of cultivators decided to separate into independent families, in this way creating the need for additional bullocks. Under such circumstances, a farmer who raised bullocks for his own use might not have a replacement at the moment when the animal was needed. To purchase bullocks offered the only available option. Occasionally, a farmer decided to keep a male calf for later use as a bullock. Such calves were castrated by a veterinarian or by the traditional method of beating the testicles with a stick until they were shrunk. Farmers who had no need for a male calf would sell it, sometimes with its mother. A good profit could usually be made by buying a dry cow, having it impregnated, and eventually selling the cow with its calf, or the calf alone.

The price of bullocks varied greatly based on the state of the market and the quality of the animal as evaluated by a potential purchaser. Although bullocks were bought for use rather than for trading and speculation, farmers occasionally did sell them when they thought that they could earn a profit. We once observed the efforts of a Jat farmer as he attempted to sell a yoke of bullocks. He had arranged a demonstration

of plowing by his bullocks in the presence of a small group of farmers from a neighboring village. The farmers watched silently and intently. They paid absolutely no attention to us, which was rare. Even when people were very busy, they would usually take a few minutes to talk to us. Several of the visiting farmers worked the bullocks for brief periods. Presumably, those farmers who were still interested after the demonstration would have bid for the bullocks. We questioned one farmer of Shanti Nagar about the reason for the sale. He explained that the price of bullocks had risen greatly. He assumed that if the farmer who was showing his bullocks sold them, he would buy less costly replacements elsewhere. He no doubt saw an opportunity to earn a profit.

After the Green Revolution, all the agricultural functions (except dung production) that bullocks performed in the 1950s could be performed by machinery in the 1970s. The result was a drop in the number of bullocks from 95 to 12. From fulfilling an essential role in agriculture, bullocks had been reduced almost to the status of a quaint anachronism. The few farmers who owned them were generally conservative older men. Also, there were a few practical reasons for having a few bullocks in the village, such as for sowing rows of mustard in wheat fields. But it will not be long—perhaps the time has already arrived—when it will be as rare to see bullocks plowing wheat fields in northwest India as to see horses plowing corn fields in Ohio, except in Amish country.

The fact that only 12 bullocks were used in Shanti Nagar meant that most of the 29 male zebu calves were relatively useless to the Hindu villagers. Surplus zebu were sold to buyers from outside Shanti Nagar. Sometimes a cow was sold with its calf; sometimes a male calf would be kept until it was three years old and then sold. Villagers explained that the males would be used as bullocks in other villages in other regions. The neighboring state of Haryana was often mentioned as a region where male zebu cattle could be sent. However, Haryana has traditionally exported cattle (Singh and Branford, 1935: 37). Furthermore, farming in Haryana, the Union Territory of Delhi, and neighboring regions is becoming increasingly mechanized. The explanation that male zebu would be used as bullocks elsewhere becomes increasingly persuasive as Indian agriculture increasingly mechanizes. Obviously the proportion of villages that are net exporters of male zebu cannot indefinitely expand at the expense of the net importing villages.

MALE WATER BUFFALO

Aside from one bull that Shanti Nagar shared with a neighboring village, there were no mature male water buffalo in Shanti Nagar. Because male buffalo were not used as draft animals (except for one buffalo that drew a cart in 1978), they were not kept to maturity. In the 1950s, villagers let the weaned male buffalo calves die of neglect, turned them loose to wander, or sold them to buyers from outside Shanti Nagar, who proposed to use them as draft animals but who in some cases probably slaughtered them. Villagers said that they would not knowingly sell an animal for slaughter. They were aware that an unknown buyer might deliver a buffalo to the slaughterhouse, but they preferred to ignore this possibility.

The sentiment against slaughtering cattle was powerful in Shanti Nagar in the 1950s. People were reluctant to discuss the subject, and we questioned few villagers about it, principally because we would repeatedly hear the standard explanations: Surplus animals were released to wander or were sold for use as draft animals elsewhere. However, the villagers knew the score, and they gave the game away when they asked us about life in America. One of their favorite ways of teasing us was to ask about how cows were treated in America. The line of questioning was about as follows: Do you have lots of cows in America? Yes. Do you respect the cows? Yes. Do you plow with bullocks in America? No. What happens to the male cattle if they are not used as bullocks? Then our interrogator would look intently at us with just a trace of a smile lurking around the corners of his mouth. We did not at first know how to respond, but finally we hit on the answer: "What happens to male cattle in America is not much different from what happens to excess male water buffalo in India." Sometimes people smiled. That response became our standard comment and usually got us off the hook.

The prohibition of cattle slaughter is an extremely sensitive issue among Hindus. It is based on two doctrines, ahimsa and the sanctity of the cow. Ahimsa, which holds that one should not take life or harm any living being, is a wider doctrine than what Dandekar (1969: 1561) calls "cow-worship". Originating in Buddhist thought at the time of Ashoka, ahimsa was adopted by Jainism, from which it entered Hinduism (Basham 1954: 54, 123, 285, 292). Among Jains, even insect life is protected. Despite ahimsa, Hinduism generally tolerates the slaughter of relatively small domestic animals, such as chickens, goats, and pigs (Dandekar 1969: 1561). In parts of India, animals, even rarely including water buffalo, are sacrificed in religious rites. The strong protection of cows is due more to their holiness than to ahimsa. The sentiment toward cows has been extended in attenuated form to all cattle. Their slaughter would not be permitted in Shanti Nagar by any caste, although pigs and chickens were routinely killed by Chuhra Sweepers, the lowest-ranking caste and the one least influenced by ahimsa and orthodox Hinduism.

Villagers treated male buffalo calves somewhat differently in the 1970s than in the 1950s. Although they still disposed of male calves at a relatively young age, as is indicated by the fact that female buffalo calves outnumbered male calves by two to one (table 5), they no longer released the males to wander and die. Instead, they sold them to buyers from outside Shanti Nagar. Villagers told us that the males would be used in other areas to pull carts. It was unlikely however that all of the surplus male buffalo from Shanti Nagar and the surrounding region would ever be used as draft animals, for water buffalo were generally not used to plow in northern India, and buffalo carts were giving way to motorized transport. One farmer said, "Buffalo cannot be used for plowing in summer because there is too much sun and in winter because it is too cold." We heard this explanation from no other farmer.

The Green Revolution changed the cattle population in such a way that there were too many male cattle to be disposed of in the approved traditional ways. This was especially true of male buffalo, but even male zebu could eventually become a problem. Consequently, villagers spoke more frankly about cattle slaughter in the 1970s than in the 1950s. Reformer, a Jat farmer, expounded:

We sell the male buffalos and butchers take them. We used to keep them, but if we left them to wander, they would spoil the crops. And you can't keep two buffalo bulls in the same village. They would fight and kill one another. Zebu bulls can stay together but not buffalo bulls. We sell the male zebu in Haryana or Uttar Pradesh where they don't have as many tractors. Slowly the zebu breed will be replaced by tractors and water buffalo and will be finished. I want to buy an American cow because she gives more milk than zebu cows. Although there are some in government dairies, none are available for sale.

A Brahman farmer, who in the 1950s said that male buffalo were released to wander and for whom the idea of cattle slaughter would have been anathema, said in 1978:

Male water buffalos can now be sold. They are used to pull carts and to plow. Farmers from Uttar Pradesh and Karnal District [Haryana] come here to buy male water buffalo and some are bought by butchers. A *katra* (male water-buffalo calf) can be sold after its mother has stopped giving milk when it is about one year old. It can be sold for Rs. 200 to Rs. 250. I plan to sell one of my *katras* after the buffalo stops giving milk. I will receive Rs. 200 or more.

A zebu calf to be used as a bullock is castrated at the age of about 18 months. It is done at the animal hospital at the Block Development headquarters. The old process of beating the testicles with sticks was cruel. Next a hole is made in the young bullock's nose and it is trained to plow by yoking it with an experienced bullock. Farmers from other villages come here to buy bullocks. The news spreads that a young bullock is for sale. Usually a bullock is sold from this village without being trained. I have sold five or six male zebu calves since you were here last.

A Jat farmer, whom we call Actor, arrived toward the end of this interview and sat down to listen. Concerning male buffalo calves, he matter-of-factly commented, "Maybe butchers will come to buy them." But even for this middle-aged practical farmer, zebu cattle should be treated differently. We were sitting with him one day when a man from another village came by who wanted to buy a male zebu calf (*bachra*). Actor said, "There may be two reasons for the purchase. He may sell it for a higher price or he may intend to raise a bullock. The cow and her calf may be sold together if the buyer is a proper person and will use the animals properly and will not sell them to a butcher." We asked, "Is this man a proper man?" Actor replied, "It can be known through his face and by making inquiries in his own village." A farmer would be well advised to be sure of the person to whom he sold a cow. We recorded a case in the 1950s in which a village council fined a man Rs. 25, a heavy fine by village standards at the time, because he sold a cow to a man suspected of being a Muslim. There is no reason to doubt that a similar action could have taken place in the 1970s.

The economic function of male buffalo when they left Shanti Nagar probably had as much to do with markets for hides, meat, and bones as with the need for draft animals in distant regions. With regard to male buffalo calves, villagers accepted the likelihood that they will end up in the hands of the butcher, a possibility that villagers found upsetting in the 1950s. This apparent attitudinal change may have stemmed partly from an increase in the value of male buffalo calves. Although we have relatively few figures and most of them are not age-specific, male buffalo calves in the 1970s could be sold for almost 10 times as much as in the 1950s. Even with economic inflation taken into account, the value of male buffalo calves had substantially increased. Although most villagers were much happier when a buffalo gave birth to a female rather than a male calf, one farmer commented that to him it made little difference, as a male calf could also be sold for a good price.

The increased value of male buffalo calves was probably related partly to a social change that has affected the disposal of dead cattle. In the 1950s, the hide and bones of dead cattle were scavenged and sold by Chamar Leatherworkers, who were given the carcasses of dead cattle in payment for disposing of them, as was their traditional duty. Although the meat had scant value in Shanti Nagar, where eating beef would be anathema even for nonvegetarian Hindus, both the hides and bones were salable. A number of men, perhaps a dozen if a full-grown water buffalo was involved, would be required to remove the carcass to the area just beyond the Chamar quarter where it was flayed. The men of Leatherworker families skinned dead cattle in rotation. The hide was then auctioned within the Leatherworker caste and the proceeds deposited in the community fund of the Chamars. The successful bidder usually attempted to sell the hide at a profit to one of the buyers who regularly visited the village. The community fund was used to sponsor an annual religious feast and to meet other community expenses. If any balance remained in the fund at the end of the year, it might be divided equally among the Chamar families. A hide was valuable: that of a full-grown buffalo could be worth as much as Rs. 25. We recorded the auctioning of one buffalo hide for Rs. 20. After a buffalo had been flayed, its bones were picked clean by village dogs, cats, and vultures. The bones were sold to itinerant buyers, and the money deposited in the fund.

The disposal of dead cattle was considered polluting and demeaning, and the Leatherworkers knew that the occupation had been abandoned by Chamars in other villages (e.g., Lewis 1958: 75). However, they argued that there was nothing wrong with salvaging the hides of dead cattle. "We must have leather to make shoes," observed one of our informants. "We do our work and wash our hands and eat." He also advanced the argument that when any commodity became scarce, its price increased. It followed that the skins of dead cattle should be recovered to maintain a low price for leather. Nonetheless, the Leatherworkers were uneasy about skinning dead cattle. We once went to observe Chamars as they flayed an animal. The men who were doing the work, ordinarily very hospitable, were so clearly embarrassed and unhappy because of our presence that we quickly left.

In any event, Leatherworkers had given up the disposal of dead cattle by the time we arrived back in Shanti Nagar in 1977. Unflayed cattle were buried by their

owners. Burial would have reduced the number of hides on the market and might have been a factor in raising the price of male buffalo calves and other surplus cattle. In addition to the domestic market for leather products, the international market must also be taken into account. During 1976–1977, for example, Indian leather exports (excluding footwear) amounted to Rs. 2.64 billion (India, 1978: 325). Some farmers thought along these lines. We were once sitting with a large group of men who were making arrangements for the burial of a zebu cow. A discussion started about Leatherworkers and the disposal of dead cattle. An elderly Baniya Merchant man said, “The Leatherworkers no longer do that work, and one thing can mean many things. It means that their financial position is better than formerly, that their sons are now educated and do not want to go to their offices with their hands dirty from that work, and that they no longer want to be called Chamars. They get angry if they are called Chamar or *Chamarin* [female Chamars].” A Brahman farmer took up the thought, “The current system wastes hides. Shoes could be made of them or they could be exported and sold for a lot of money. Also, the bones are wasted and formerly they were sold.”

ZEBU AND BUFFALO COWS

The Green Revolution had different effects on zebu cows and buffalo cows. They both produce milk, ghee, and dung, essential commodities for every village family. However, the number of zebu cows remained constant from the 1950s to the 1970s. Because the human population was increasing, the ratio of zebu cows per person therefore declined. On the other hand, buffalo cows kept pace with the growing human population. Their number grew at the same rate as that of the human population. Under conditions brought about by the Green Revolution, it is clear that the buffalo cow was the villagers’ milch animal of choice. However, detailed comparison of the two cows shows that, although the buffalo was better than the zebu in most features, the zebu cow still had some advantages. A close look at the two cows suggests that, despite the currently formidable advantages of the buffalo, there could be a niche for an improved breed of cow.

The buffalo, a larger animal than the zebu cow, produced more milk than the cow, about twice as much according to the villagers. Her maximum yield was greater, she gave more milk on an average daily basis, and her lactation period was longer. Not only did the buffalo give more milk, but its fat content was higher. This feature was extremely important because much milk was made into ghee. The villagers said that it took 14 kg of zebu milk but only 10 kg of buffalo milk to yield 1 kg of ghee. The ratio of 10 to 14 agrees well with the ratio of the fat content of zebu milk, 4.97%, and buffalo milk, 7.64% (Kay, 1974: table 71).

Homemade ghee is the gold of village India. In 1958, ghee sold in Shanti Nagar for Rs. 6.50 per seer (kilogram). At that time, the usual daily wage for agricultural labor was Rs. 1.50 per day. In 1978, a kilogram of ghee was worth Rs. 32 at a time when day labor was paid Rs. 6 or Rs. 8 per day. As for dung, the villagers’ general statements—that the buffalo produced a daily average of approximately 20 kg, about twice as much as the zebu—agree reasonably well with figures cited by Saha (1956: 923), 27 kg per day for the buffalo cow, 11 kg for the zebu cow.

The farmland of Shanti Nagar was better suited to buffalos than to zebu cows. Buffalos like stall feeding; they can stand being alone. Zebu cows like to graze and apparently like the company of a grazing herd. A farmer remarked that they give more and better milk if they graze with other cows. Buffalo do well in irrigated areas with a limited amount of grazing. Rainfed areas favor zebu cows. Even in the 1950s, irrigation was having an effect on the cattle population. A young farmer once told us that the number of zebu cows in the village had been reduced during his lifetime and that water buffalo had increased. The environment created by the Green Revolution enhanced this tendency in two ways. Tubewells increased the land under irrigation, thus reducing the *barani* area, and the crop cycle was compressed so that there were fewer fallow fields available for grazing.

The land available for grazing varied in the course of the agricultural year. In mid-December, when the newly sown wheat was beginning to appear and cattle had to be kept out of private fields, we passed a small herd of cattle grazing on common land near the village school. We could see almost no grass and wondered what the cattle found to eat. In winter, they often did not get enough to eat. There were grazing areas available during the winter wheat season, but they were inconveniently located at some distance from the habitation site. One area was near the canal at the western edge of the village; the other, near the railway at the eastern end. The ditches along the road also offered grazing. But the pasture land of the 1950s had been occupied. The barren area was now the grazing land.

At the very beginning of April, the situation was much the same. We were interviewing an elderly Brahman man in his cattle shed about his ghost possessions when he complained that the family buffalo were hungry. It was about 4:30 in the afternoon, and his nephew's wife had not yet come to chop their fodder. He said that the proper time to feed them was 3:00 p.m. When we asked about grazing his cattle, he replied, "The wheat crop is standing and all the fields are filled. There is no jungle. After the wheat crop is harvested, we'll take these animals to graze."

In mid-April, however, there were enough empty fields to graze cattle. We were sitting with a Brahman farmer in late afternoon when his two female buffalo calves returned from grazing. The village herder, a Sweeper man, collected the cattle of his clients around 9:00 a.m. and brought them back to the edge of the village around 4:00 p.m. where he released them to find their own way home. He charged per month Rs. 3 for a young unmated buffalo, Rs. 4 for a cow, and Rs. 6 for a buffalo. At this time of the year, the wheat harvest was fairly well along and there was considerable forage in the fields.

Regarding his buffalo calves, the Brahman farmer said, "A female buffalo calf can be sold after four years [that is, after being mated for the first time] for Rs. 2000 to Rs. 2500. I will have them impregnated in a couple of months and sell them after 10 months just before delivery. At that stage of pregnancy, a buyer can see the size of the udder and estimate the milk potential. However, people usually milk a buffalo before buying it." The rule of thumb for the price of a buffalo in 1978 was Rs. 200 per kilogram of milk.

Despite the practical advantages that buffalo had over zebu cows, chiefly their greater yield of milk and dung and the higher fat content of their milk, the zebu cow

nonetheless had several points in its favor. Her male calves were worth more than male buffalo calves, about four times as much, because bullocks were still being used in agriculture. This advantage will probably hold for the foreseeable future although it will be eroded as farming is progressively mechanized. The one advantage that will not lessen is the sacredness of the cow. The zebu cow is sacred and the buffalo is not. The religious veneration of cows is a major reason for the presence of as many of them as there are in Shanti Nagar.

One need only listen to what Hindus say about cows to be convinced that they are indeed sacred and that Hindus strongly desire their presence for that reason. In 1958–1959, we asked a random sample of villages, “What is the best thing in the Hindu religion.” The single most common response was “the cow”. In 1978, villagers frequently mentioned the sanctity of the cow when asked why they owned them. A Brahman schoolteacher who owned a buffalo, two female buffalo calves, three zebu cows, and three female calves said that he favored the cow. He mentioned a few practical reasons—for example, that cows were impregnated by the wandering bull while they were grazing without their owners’ making a special effort or incurring a stud fee, while the fee for mating a buffalo was Rs. 20—but then he said, “But the main thing is that the cow is sacred. The buffalo is more valuable, but the cow is sacred. In ceremonies, it is the cow that is given as a gift and not the buffalo.” This interview took place on Makar Sankranti, a festival when newly married women give presents to their husbands’ relatives. Standing on the veranda was a cow that our informant’s wife had given to his sister, a visible illustration of the ceremonial role of the sacred cow.

We asked the Brahman farmer mentioned just above, who owned one buffalo, two unmated four-year-old buffalo calves, one young male buffalo calf, one zebu cow, and one male calf, why he kept a cow. He replied, “The cow is mother. A Hindu should keep one cow to have the darshan of the cow. To take care of the cow is a sort of puja. I may keep one or two buffalo but I will certainly keep a cow. It is my duty.” Although our quotations are from Brahman men, which could suggest that the reverence for the cow was an affair of the high castes, in fact this sentiment was shared equally by high- and low-caste men. In response to our question about the best thing in the Hindu religion, 9 of 34 low-caste men and 9 of 33 high-caste men chose the cow (S. Freed and R. Freed, 1976: 231, table 78). Religious sentiment was definitely a factor in determining the demographics of the cattle population of Shanti Nagar.

Since dead cattle in the 1970s were buried, interment offered a way to show respect for the cow that may have been uncommon 20 years earlier. In the 1950s, we never saw a ceremonial cow burial and assumed that all dead cattle were treated the same: the Leatherworkers took them away and flayed them. In the 1978, we saw a ceremonial cow burial. In February, we heard that a Brahman’s cow had died. We went to his cattle shed to see what would happen. A number of people had assembled, and, after some general conversation, they began to discuss how to transport the cow to the burial ground. The consensus was that the cow should not be taken away on a cultivator but that a trolley should be used. Finally, a young farmer arrived driving a tractor with a cart attached. The Brahman went into his cattle shed, tied the cow’s feet together, and tied a rope to its jaw forming a loop. Bamboo sticks were put

through the ropes and six or eight men carried the cow out of the gher and loaded her into the cart.

The tractor drove to a spot near a garden at one corner of the village, the men walking behind. One of them carried a metal tray with salt and a green cloth on it. The grave had already been dug. It was at the edge of the habitation site near a ditch that separated it from the fields. A man enlarged it slightly. The men put the cow into the grave, spread the green cloth over it, and scattered salt on the cow and the cloth. The men said that cows were covered with a cloth because they are sacred. The men then partially filled the grave to just below ground level where they laid thorny branches. The idea was that if a dog began to dig into the grave, it would encounter the thorns just below the surface. The men then finished filling the grave. As the tractor drove away from the grave, three or four children were hanging from it, which seemed to us a dangerous practice.

Reverence for the cow had one unfortunate side effect. The village could not provide a place for all the cows born there. The number of village cows was kept in check by the sale of some, by the disposition of others as gifts in ceremonies, and probably by relative neglect that led to an early death of still others (Dandekar, 1973: 20). Some cows were released or allowed to escape into the fields where their presence was tolerated because of their sanctity. Such cows formed feral herds that caused significant damage to crops. Villagers told us that there was a herd of about 20 feral zebu cows that rested on uncultivated government land along an irrigation canal during the day and at night entered the cultivated fields to graze. They generally followed the same nightly route, and some farmers whose fields lay in their path spent the night in the fields to guard their crops. Although we never saw the herd, we interviewed two farmers in the evening as they were making preparations for their nightly vigil. One of them pointed out the wheat in his field that he claimed the herd had trampled. In our opinion, the damage was considerable.

Three years after we left the village, one of our research assistants went there to collect some songs for us. In the course of his visit, he observed a spectacular invasion of feral zebu into cultivated fields. He wrote:

One strange thing which I observed was that around 5:15–5:30 p.m., [a Brahman farmer] took me to the fields and told me that recently some wild cows have started coming over and they destroy tomatoes and wheat. By that time most of the people had reached their fields when in the north-east corner there was some noise. In the west some people had burnt fire. Within a couple of minutes I saw this horde of wild cows and bulls running at a constant speed and people chasing them making noise and throwing fire. But I could observe an element of fear among the men running after the horde. The cows and bulls were really very strong. The whole scene lasted for 15 to 20 minutes and then everyone came back.

The zebu cow had another advantage over the buffalo in addition to its sacredness. Taking care of her was less work than caring for a buffalo. A buffalo had to be bathed everyday, but not a cow. Moreover, zebu cows mated in the fields, but buffalo cows had to be taken to a bull for mating, and the standard stud fee was Rs. 20.

But whether buffalo or cow, cattle required hours of work every day both to feed them and to process their milk and dung. These chores, like so much of the work in the village, was the lot of women.

On a pleasant day in mid-January at about 2:45 p.m., we noticed Saroj, a 31-year-old married Brahman woman, leaving the courtyard of our house carrying a headload of chaff wrapped in a cloth. We knew that she was headed for the family cattle shed to feed the family's buffalo, zebu cow, and two calves and so we went with her. The family's two unmated buffalo (*jhutiya*; see S. Freed and R. Freed, 1981: 485–486 for a discussion of terminology) were grazing in the fields. We passed several men sitting and talking in front of a Jat's *baithak*, and then, turning into another lane, we walked by a group of men playing cards in front of a Brahman's *baithak*.

We arrived at the cattle shed. Saroj planned to feed the cow inside the shed and the buffalo, outside. She explained that the cow had given birth to a male calf about four or five weeks earlier, and she was afraid that the cow would catch cold if fed outside. There was no electricity in the shed or in the adjoining *baithak*. We noticed some small clay lamps in the *baithak*. Saroj put the headload of chaff at one end of the *baithak* with some other chaff. She fed some chaff to the animals before returning to her house to fetch more food for the cattle.

She returned to the shed with a large brass pot full of a mixture of mustard oil-cake, gram flour, cottonseed and jowar. We asked if the mixture had been cooked. She said that sometimes it was cooked but not this time. She poured part of the mixture into a bucket, carried it to a hand pump where she added water, and then poured the mixture into the chaff which she stirred with her hands. By this time, it was about 3:00 p.m. She led the cow to the shed and tied it inside, spreading a little chaff under it. She said that the calves were not fed cottonseed, which was expensive, because they did not give milk. She would go to fetch some clover (berseem) for them, which she would also feed to the other cattle.

Saroj said:

The buffalo is currently giving 5 or 6 kg of milk per day [she was milked twice a day]. The cow is giving 5 kg per day, but the calf is drinking half so that the family is getting only 2.5 kg per day. It's a male calf, and we are taking good care of it so that it will grow up well. It is only five weeks old. We'll eventually sell it but I do not know at what age. [A woman sitting on an adjacent roof said at the age of five years. The head of the household, Adjudicator, later said that he would sell it at the age of 18 months.] The buffalo calf is a male. It was born seven or eight months ago. My father-in-law [Adjudicator] bought the buffalo and calf when the calf was one month old. At first, the buffalo was giving 12 to 13 kg of milk [including 1.5 kg that the calf drank]. The buffalo and calf cost Rs. 3000. Eventually, the calf will be sold.

We accompanied Saroj to Adjudicator's nephew's house to get some clover. His wife was cutting clover with a mechanical fodder cutter when we arrived, and she asked Saroj to help. Saroj began to press the clover into the fodder cutter (figs. 57, 58).



FIG. 57. Manually operated fodder cutter. One woman turns the wheel while the other feeds fodder into the machine.



FIG. 58. Fodder cutter powered by a tractor. These machines were dangerous. We know of two men who lost hands while feeding fodder into the cutter. In 1978, such devices had no safety mechanisms.

Saroj wrapped the chopped clover in a cloth and carried it on her head back to the cattle shed. She mixed wheat chaff, clover, and water. It was then 3:30 p.m.

Saroj said:

The health of the buffalo has declined lately. We've been harvesting tomatoes and haven't been able to feed her at the proper time in the afternoon. Today, we didn't go to the fields to work, and so I could feed the buffalo on time. It is the same way with men. The proper time to feed cattle in the morning is before 4:30 a.m. We were up late last night, until 11:00 p.m.,

and so we didn't get up until 4:30 a.m. today. We were therefore late in feeding the animals this morning. I mixed some chaff, oilcake, and clover for the animals at about 11:00 p.m. There are only two real meals, morning and evening, but we leave the cattle a little fodder during the day and also some for the night. In the morning, we bathe the buffalo. The cow and buffalo are milked at about 5:00 a.m. and again at 5:00 p.m.

Adjudicator's two unmated buffalo went past the door of the cattle shed and someone went outside to fetch them. The cowherd had released the cattle at the edge of the village to find their own way home. Saroj said that for two days, the family was working in the fields and the shed was closed so that the animals went right by it and continued to the fields. This behavior had become a habit which was why someone had to go for them that day even though the shed was open.

It was now 3:40 p.m. and Saroj was loading dungcakes into a *bitaura*, a hut-like structure made by piling up dungcakes and plastering the pile with dung; this covering, when dry, was designed to protect the dungcakes from rain (fig. 61). The *bitaura* was covered with a straw mat for additional protection. A supply of dungcakes had to be stored during the winter in order to have sufficient fuel for the monsoon season when it was impossible to dry dungcakes. Dung produced during the rainy season was used as fertilizer. Cattle dropped less dung in the summer than in the winter. A grown buffalo produced enough dung for five or six large cakes in the summer—when of course dungcakes could not be made—and 10 in the winter. The difference in dung



FIG. 59. Brahman woman loading dung onto a metal tray. She will carry the dung to the family plot to make thin dungcakes for cooking fuel.



FIG. 60. Making thin dungcakes.

production was due to diet. In the summer, cattle were fed wheat chaff; in the winter, jowar (S. Freed and R. Freed. 1978: 81–82).

It was then 3:45 p.m. and Saroj was collecting dung from under the animals. She mixed a little chaff into the dung, loaded it onto a metal tray, and carried it on her head to the family plot of 11 *biswas* where thin dungcakes were made. She made a number of thin dungcakes and spread them out to dry (figs. 59, 60). The heavier thick cakes were made in the cattle shed and dried around the *bitaura* (fig. 61). In general, thick cakes were used when it was necessary to keep a fire going for a long time, as for cooking milk. The thin cakes were for immediate use in cooking meals.

Saroj returned to the cattle shed carrying a load of dry thin cakes on her metal tray. She reloaded them into her basket, and added a few of the thick dungcakes. She left for home. It was then 4:05 p.m. The men were still playing cards in front of the Brahman's *baithak*. When Saroj arrived home, she immediately busied herself with squeezing the seeds out of tomatoes into a clay pot and preparing vegetables for the evening meal. At 5:00 p.m., she lit a fire of dungcakes and put the vegetables in the kitchen ready for cooking. At 5:15 p.m., Saroj went back to the cattle shed to milk the cow and buffalo. On the way, we commented that it was nice that she did not observe *purdah*—that is, cover her face—in front of Stanley, which would normally have been proper behavior because he was senior to her husband. She laughed and said, “At first I felt shy but the others told me that he wouldn’t like it if I did.”

Saroj was from Delhi. She was a most efficient worker. She said, “I learned everything after I came here to the village. It was difficult in the beginning, but I don’t



FIG. 61. Large dungcakes drying on the ground. In the background is a pile of dungcakes neatly arranged for storage. The pile will be plastered with a coating of dung to protect it from the rain. To gain access to the stored dung, a small hole is made close to the bottom of the protective wall and dungcakes removed as needed. The finished structure is known as a *bitaura*.

feel any difficulty now. I'll face all my work. My father and brother didn't believe that I could do the work." We asked her why her parents had arranged a marriage to a village man. She replied that her late first husband—she was later married to his younger brother—was educated and a teacher in a higher secondary school in Delhi, where the couple rented a house. She said, "My parents thought that my [first] husband and I would live in the city. No one knows what fate will bring."

At the handpump, Saroj washed two buckets that she had brought for the milk, and we entered the cattle shed. First, she let the cow's calf drink some milk. Saroj's husband's sister, Savitri, came to help, and she supervised the calves. Saroj tied the hind legs of the cow together. Savitri took the calf away. Saroj washed the cow's teats. Savitri positioned the calf where the cow could see it and lick it. Saroj began to milk the cow from the left side, holding the bucket between her knees. Saroj changed her position slightly, holding the bucket in one hand and milking with the other.

Saroj explained why she was taking especially good care of the cow and its calf. She said, "This is the cow's third calf. The first two died, and so we cut off the tips of this calf's ears so that it would not die. [This is a magical cure, not a veterinarian's recommendation.] Human ears are pierced for the same reason. When this calf is two years old, it will be made into a bullock." There were three notches in the cow's right ear. Saroj did not know why; they were there when the cow was purchased.

Having finished milking the cow, the women turned their attention to the buffalo (fig. 62). It was then 5:25 p.m. They washed her teats, but her legs were not tied. Cow's milk was for drinking, and the family drank all of it. Some buffalo milk was drunk, but generally it was processed into curd and ghee. A buffalo gave birth to a calf in the 11th month, a zebu cow, in the 10th month. This buffalo had her calf 7 months earlier and was expected to have another one in 5 months. A buffalo could be milked for 9 or 10 months after giving birth. We looked in the buckets. There appeared to be two or three times as much buffalo milk as cow milk. Saroj fed fodder to all the animals. It was 5:35 p.m.

When we arrived back at the house, the mixing and handling of the milk went so fast that it was hard to follow. In any case, part of the buffalo milk was poured into a pot. Then *milai* from cow's milk, the solid part that forms on the surface when milk is boiled, was added, and then buffalo milk from the morning that had been boiled during the day was poured in. The evening milk was not boiled. Later in the evening, buttermilk (*chhachh*) would be added. The women said that the mixture would be churned the next morning at 5:30 a.m. It was then 5:55 p.m. Saroj had been working steadily since 2:45 p.m. when we began to watch her and her workday was by no means over because she had yet to help to cook the evening meal.

This activity was approximately half of her workday. The other half began at about 4:30 a.m. when she fed and milked the cattle, ground the daily supply of flour in a stone handmill, often made ghee, and cooked the morning meal. When not occupied with chores around home, she was working in the fields, for this was the tomato season. Much of this work was skilled and it was often physically taxing. Household work, raising children, care of the cattle, and much work in the fields were the domain of women. One day early in February, we were in the fields with a new assistant. He



FIG. 62. A teenage Brahman girl milking a water buffalo.

looked around in bewilderment and asked us where all the men were because he could see only women working in the fields. We smiled and said to ourselves, "City boy. What does he know? He'll soon learn."³⁴ Our hats are off to the women of north Indian villages, and to the men too—when they are not spending all afternoon playing cards.

Adjudicator did a rather lively business selling ghee to fellow villagers. In fact, he did so well that he claimed it was possible to recover the cost of a buffalo in one year. Families with milk in excess of family needs could either sell it or make ghee. Ghee could be stored without spoiling. Milk sold in the village for Rs. 2.25 or Rs. 2.50 per kilogram. Ghee cost Rs. 32.00 per kilogram. The value added by processing 10 kg of buffalo milk into ghee was therefore Rs. 7.00, a significant sum. In addition, the family set the milk for curd before churning it, and after churning there was some buttermilk to drink. Moreover, some of the residue from making ghee could be mixed with fodder and fed to cattle.

Making ghee required a fair amount of work. It is a process for removing the impurities from butter. Butter spoils without refrigeration, but ghee can be kept for a long time. We observed the process once, in Adjudicator's family. It was carried out in conjunction with cooking breakfast and a trip to the cattle shed to offer the first piece of bread to the family cow. While Saroj fried bread for the morning meal, three women made the ghee: two sisters of Saroj's husband, Savitri and Chameli, and Shanti who was Saroj's mother-in-law. The process lasted a little more than an hour. One woman may have been able to do the work by herself had there been no time pressure, but in this case, Saroj's husband had to be fed by 8:00 a.m. when he left for his city job. A lone woman would have been hard-pressed to meet this schedule.

We went downstairs at 7:00 a.m., but the women told us that it was not yet time. In fact, they were already at work churning the milk. When they called us about 15 minutes later, they had finished churning, and someone from another family had come for some free buttermilk (*chhachh*) just as we came downstairs. We had seen women churning milk before, and so we really missed nothing (fig. 63). The previous evening, the milk had been set for curd, which had been removed in the morning before the milk was churned. They added some *bathua* to it. They wanted to have the curd ready in time for Saroj's husband's breakfast. Adjudicator ate later, at 11:00 a.m.

Savitri was carefully cleaning the butter from the churn and putting it back into the earthenware churning pot (*bilowani*). She then washed the churn so that any butter sticking to it fell into the pot. Then Savitri took the butter out of the pot and put it into a brass pot. More buttermilk was drained off, and the butter was put into a clay pot. The buttermilk was poured into an aluminum container, and *bathua* was added. Then Savitri put the butter back into the brass pot. The way the women moved about the kitchen and shared the work was a model of efficiency. There was no wasted motion and they never got in one another's way although the working area was tiny.

They set the brass pot containing the butter on the back of the stove to warm. Saroj was baking bread (*roti*). The griddle for bread was on the front of the stove with the pot of butter behind it. The first piece of bread that Saroj baked was for the family cow. Chameli took it to the cattle shed along with a cake of gur. The women pre-



FIG. 63. Brahman woman churning buffalo milk. The churn has an earthenware pot, a lid, and a rope wrapped around a vertical wooden shaft. The woman spins the shaft by alternately pulling the ends of the rope.

pared a tray of food for Saroj's husband with bread and butter and curd. Savitri took it to him. Saroj was busy baking bread. She squatted on a low wooden stool while she cooked.

After the butter had all melted, the brass pot was taken off the stove and water was added. This caused the butter to separate into three fractions. A brown froth (*pui*) rose to the surface. The butter was allowed to cool for a few minutes, and then Savitri carefully skimmed off the *pui* with a spoon. It would later be mixed with wheat chaff and fed to cattle. The second fraction, also an impurity, was known as *cheru*. It collected at the bottom of the pot and ghee, the third fraction, was partially removed from it with a strainer. When the strainer became ineffective, Shanti continued to separate the ghee from the *cheru* with her fingers. It appeared that ghee stuck to her fingers but the *cheru* did not, so she could dip her fingers into the ghee and then allow it to drip off into a tin can. *Cheru* was mixed with cottonseed (*binola*) and also fed to cattle. Not wanting to waste a drop of ghee, the women poured the *pui* back into the brass container with the *cheru*. The women said that there was a little ghee left and that they would take it out. Cold water was poured into the pot, which appeared to make the ghee rise to the surface. All this time, Saroj was busy making bread.

The ghee floated upward, and Shanti, Saroj's mother-in-law, picked it off the surface. Shanti was the senior woman present, and we had the impression that it was she who took charge of the ghee at the end of the process. In any case, she could not have helped with the churning because of an injured shoulder. Chameli took the churn pot and washed it at the handpump. A brass bucket of milk had been brought, probably from the morning milking. The milk was poured into the churn pot and some water was added. The women said that they would heat the milk. The work was finished at 8:16 a.m., in a little more than an hour counting the churning. As we were leaving, the family gave away some more buttermilk.

Cattle husbandry would probably be simpler and easier for women if one breed of cow could be found to serve the functions of both zebu cows and buffalos. Farmers could then replace the current bovines with the super cow. The Government of India has for years been conducting crossbreeding experiments in search of a cow that approximates those requirements, especially with regard to increased milk production. Hopes were high for the crossbred cow. George (1984: 2169) wrote that the crossbred cow "seems to be a reincarnation of the Kamadhenu of Indian mythology, the divine cow that granted all desired [sic] and whose tail had only to be clutched for safe conduct across the unknown to heavenly bliss." Crossbred cows had been on the scene in the Shanti Nagar region for some time and could be purchased in Karnal, Haryana, about 75 miles north of Delhi. However, no farmer in Shanti Nagar had as yet purchased a crossbred cow. Instead of clutching her tail to be dragged to paradise, farmers were looking at her with a hard, skeptical eye.

We had only one interview with a farmer on the subject of crossbreeds, our old friend, Reformer, who was open to almost any new idea. He said:

There are no crossbreeds in this village. They haven't been publicized in this region, and people here are lethargic. Artificial insemination is required and people aren't interested. If I got into the business first, I could make a good profit selling female calves. With six or seven crossbred cows, I could start a dairy. I went to Karnal and saw three bulls used to produce the crossbreeds: a Brown Swiss, a Jersey, and one other [probably a Holstein Friesian]. I went there to buy a crossbred cow, but they are sold at auction and a good cow was selling for between 4000 and 5000 rupees. Then there are taxes and transportation expenses. Such a cow would give 13 to 14 kg of milk per day.

A good buffalo would yield that much milk, even up to 15 kg. In fact, the milk yield of a crossbreed was probably a bit higher than that of a buffalo. A woman from another village who owned an "American" cow, said that she expected her cow to give from 18 to 20 kg per day after giving birth. Nonetheless, the price for a buffalo, yielding 15 kg, was about Rs. 3500 and the low price for a crossbred cow, yielding 19 kg, was about Rs. 4000, a difference of Rs. 500. Based on the rule of thumb for appraising cows—Rs. 200 for 1 kg of milk—a crossbreed and a buffalo cost about the same, except that the comparison is between a buffalo at the high end of the scale and a crossbreed at the low end. It would seem that crossbreeds sold at a significant premium. There had to be reasons other than a few kilograms

of milk. We asked Reformer why crossbreeds were better than buffalos as reflected in their higher prices.

He replied:

There are many reasons. Cows eat less and give more milk. A crossbreed can give 15 to 16 kg whereas a buffalo gives 10 to 12 kg. The maintenance cost of a cow is low. A buffalo has to be washed daily. Fourth, a crossbred cow keeps on giving milk until one month before giving birth, whereas a buffalo stops sooner. Fifth, females can be impregnated after one year. Buffaloes require four or five years to maturity. Thus, one can possibly obtain three or four female cow calves during the time that a buffalo is maturing. Crossbred male calves can be sold [he didn't say for how much]. Females can be sold for Rs. 2000. On the other hand, there is not much profit in a male buffalo calf. The male calf of a crossbred cow, if used as a bull, can sell for 4000 to 5000 rupees.

We asked Reformer to compare zebu and crossbred cows. He said, "Zebu cows give 4 kg of milk per day. Zebu cows and crossbred cows eat the same amount. Crossbreeds are gentle, but zebu cows kick around and don't let people other than the person to whom they are accustomed milk them. Third, desi cows give less milk and for a shorter period."

By this time, Actor had arrived and, as usual, began a debate with Reformer. Given to hyperbole, he declared that crossbred cows were useless. He acknowledged that crossbreeds gave more milk than desi cows but the fat content was lower. However, the point that he strongly emphasized was the difference in the males. "The zebu male is a good bullock," he declared, "but the crossbreed cannot plow well and is not worth even a paisa [a cent]." Reformer replied that he had seen crossbred bullocks plowing but that it is not the custom to use them. The two men agreed that the crossbred bullock was big and as strong as the zebu bullock, but Actor said, "They move slowly. Zebu bullocks move faster. If strength were the only factor, then the two are equal, but zebu bullocks move faster so that they can plow 8 bighas per day while the crossbred bullock can plow only about 2 bighas." He then turned to the zebu cow to continue his defense of zebu cattle. He said that a zebu cow can give 18 or 19 kg of milk with good food. Moreover, crossbred cows are ugly.

A bit on the defensive, Reformer countered, "Crossbred bullocks can plow 5 bighas per day. The zebu cow is better looking, but no zebu cow gives 18 to 19 kg of milk. I talked to officials in Karnal and asked if rich food would increase the milk yield of a desi cow. They said 'No. The cow will only get fat. Milk yield depends on the breed.' I have seen cows at Karnal that give 30 to 40 kg per day." Reformer used a mathematical example to argue the advantages of crossbreeds. He said, "If a [exotic] bull whose female offspring give 30 kg is crossed with a [zebu] cow that gives 4 kg, the milk yield of the female offspring is $(30 + 4)/2 = 17$ kg." He no doubt picked up this calculation at the National Dairy Research Institute, Karnal. Sundaresan (1975: 139), then Director of the NDRI, gave an illustration of the advantages of crossbreeding: "For instance, if an exotic breed with an average yield of 4000 kg per lactation is to be introduced for crossbreeding on local cattle with an average

yield of 1000 kg per lactation, the first generation would be expected to produce 2500 kg. . . ."

Actor and Reformer then turned to the subject of artificial insemination. Actor said that when a cow is ready, it makes a sound and is then mated. But people use artificial insemination when the cow is not ready. Reformer said that this was not possible because insemination would not work unless the cow was ready. He said, "I know the reason for artificial insemination. It is more efficient. Otherwise the bull has to be taken here and there."

Rao et al. (1995: A-113–A-114, table 2) compiled data from a number of studies comparing crossbreeds with nondescript cattle under field conditions. There are other studies that compared different crosses with different indigenous breeds on various parameters, but most such studies were based on data obtained from organized herds. It is the studies under field conditions that are of particular interest here because our work in Shanti Nagar was such a study. Rao et al. found that crossbreeds came into first heat at an earlier age than indigenous cattle, their conception rate through artificial insemination was higher, and the age at first calving of crossbred heifers under field conditions was about one year less than indigenous cattle.

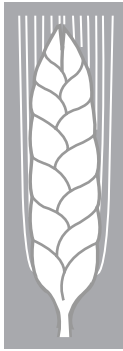
The lactation period of crossbreeds was two months longer than that of indigenous cows, and their dry period was shorter. The average lactation yields of crossbreeds were about double those of indigenous cows. All these figures show that crossbreeds were better milk producers than indigenous cows. Moreover, they were more profitable. The cost of producing milk per kilogram was substantially less for crossbreeds than for indigenous cows. In terms of net income per day, crossbreeds were three times as profitable.

However, indigenous cows had one big advantage over crossbreeds. Their bullocks were superior to crossbred bullocks. This point was strongly emphasized by Actor and acknowledged by Reformer, who generally favored the crossbreeds. Citing various studies, Rao et al. offered a highly critical evaluation of crossbred bullocks:

[They] were inferior to indigenous bullocks in terms of draught power, ploughing ability and work efficiency. [They] showed distress with increased loads and they had less heat adaptability than indigenous bullocks. . . . The indigenous animals were reported to be superior to crossbreeds in their work efficiency and rate of recovery from stress caused by work. Similarly crossbreeds were observed to show distress symptoms in carrying increased loads. . . . With increased duration of work hours crossbreeds showed more distress symptoms than indigenous bullocks. [Rao et al. 1995: A-114]

Crossbred bullocks had other disadvantages. They were more prone to disease than indigenous bullocks, they consumed more water, and they were unable to bear heat stress. Rao et al. (1995: A-115) point out "that if proper steps are not taken poor but resistant local cattle in due course of time will be replaced by disease-prone crossbreeds which is certainly an undesirable consequence." This is especially so "when viewed against the fact that bullock power continues to be the mainstay for agricultural operations in the years to come."

The excellent study of Rao et al. did not take buffalo into consideration other than to note that crossbreeds give more milk than buffalo. Their comparisons were between crossbreeds and indigenous cattle. Therefore, their analysis cannot be directly compared with animal husbandry in Shanti Nagar, where the buffalo was the dominant animal. Moreover, the fat content of milk, so important to farm families, was not discussed. Regional differences, such as how much pasturage is available, and how well various breeds take to stall feeding were not mentioned. When Rao et al. do touch on regional differences, their findings almost beg for additional research. For example, the crossbreeding program has been a spectacular success in Kerala because of particular circumstances: the percentage of crossbreeds to total cattle, 47%, was much more than for other regions. In Delhi Union Territory, the comparable figure was only 7.7% (Rao et al. 1995: A-113, table 1). Even after a century of effort to improve domestic cattle by crossbreeding with exotic dairy herds, and after its large-scale implementation in 1963 with the introduction of the Intensive Cattle Development Project, Delhi farmers apparently still find that combining buffalo and zebu cattle suits their needs better than other arrangements. Rao et al. (1995: A-115) comment, "It is high time for the planners and policy-makers to review the breeding policy and activities in the country with earnest consideration to the existing farming systems and farmer priorities." This means village studies. George (1984: 2169) sums it up artfully, "It is in this way [by comparative village studies] that rustlings at the grassroots can be related to the twitterings of policy-making above the treetops. . . ."



CHAPTER SIX

THE SECOND GREEN REVOLUTION: GENETICALLY MODIFIED ORGANISMS

THE GREEN REVOLUTION is one of the greatest technological achievements of the 20th century, but it is no longer revolutionary. Over three decades old, it is well established in its Indian heartland in the Northwest. Although it has its downside—for example, it is often argued that the increased irrigation required by the new hybrid seeds has been a factor in a lowering of the water table—benefits predominate. The yield of wheat, the chief grain, has more than doubled, helping to feed India's growing population and eliminating her dependence on foreign wheat. It has given villagers a better life. They are wealthier, healthier, better educated, and lead easier and more comfortable lives than in pre-Green Revolutionary days.

At first, the Green Revolution increased both "actual yields" and "potential yields". The actual yield of a crop is the amount harvested per unit of land under the usual conditions existing on farms. The potential yield is the maximum amount of grain that could be produced under ideal conditions. Increased yields can be obtained either by raising the actual yield, for example, by increased irrigation and more efficient use of fertilizer, or by introducing improved varieties of grains with higher potential yields.

In recent years, the techniques of the Green Revolution have done little to increase potential yields. T. R. Sinclair of the U.S. Department of Agriculture (FDA) commented, "[P]lant breeders have succeeded mainly in creating varieties that are less susceptible to pests and disease, or that can tolerate hostile environmental conditions, like drought or salty soil. The problem . . . is that pest resistance isn't increasing potential yield. It's just protecting what you have already. . . . [W]e're getting better at approaching the ceiling. What has been elusive is actually raising the ceiling" (Mann, 1999a: 312).

Increasing effort "is required to produce a constant linear rise in yields, when the projections by FAO [the United Nations Food and Agricultural Organization], IFPRI [the International Food Policy Research Institute], and the World Bank are for an exponential increase in demand" (Mann, 1999a: 312). A brilliant scientific effort produced the Green Revolution. Now it is running out of steam, but the problem of providing food for large and expanding populations at a price that ordinary people can afford is still with us. The scientists will have to come up with a second Green Revolution.

The second Green Revolution is already on the horizon. Green Revolution 1 was based on hybridization. Green Revolution 2 features modern genetic engineering, a technique for extracting a gene from a donor organism and inserting it into a recipient so that it becomes incorporated in the recipient's genome. If the source of the gene is a distant species that cannot be hybridized with the recipient, the new organism that results from genetic transfer is said to be transgenic (Lewontin, 2001: 81).

In agriculture, the chief use of transgenic DNA transfers to date has been to provide crops with immunity from insect pests or from herbicides used to control weeds. Resistance to herbicides is an advantage because fields can be sprayed with a herbicide that kills weeds without damaging the crop. The most frequently cited examples of transgenic protection from insects concern maize and cotton. Plant breeders have successfully transferred a gene from a bacterium, *Bacillus thuringiensis* into maize and cotton that causes them to produce an insecticidal compound, commonly called Bt toxin. When insects nibble plants protected by the powerful Bt toxin, they die. Bailey wrote:

The first generation of biotech crops was approved by [United States governmental agencies] in 1995, and by 1999 transgenic varieties accounted for 33 percent of corn acreage, 50 percent of soybean acreage [genetically modified soybeans are herbicide-tolerant], and 55 percent of cotton acreage in the U. S. Worldwide, nearly 90 million acres of biotech crops were planted in 1999. [Bailey, 2001: 4]

Transgenic varieties of many plants are commercially available including—besides maize, cotton, and soybeans—potatoes, squash, canola, and sugar beets (Lewontin, 2001: 82). Transgenic crops have been rapidly adopted despite stringent regulatory procedures, widespread distrust, and strong opposition in some quarters. Green Revolution 2 is coming down the tracks like a runaway freight train.

At the present time, however, transgenic varieties do not increase the potential yield of crops nor, necessarily, the actual yield. They make farming more efficient and may confer economic advantages. For example, a crop with the Bt gene does not have to be sprayed with an insecticide. Thus, Green Revolution 2, which does not increase yield, currently differs from Green Revolution 1, which did.

There is another important difference between the two green revolutions. Green Revolution 2 is much more a scientific revolution than an agricultural revolution. Genetic engineering involves new discoveries and new technologies. But its effects on the life of farm families in north India will not approach the major changes due to Green Revolution 1. Green Revolution 1 had an industrial component that had profound effects on village life. Traditional peasant farming gave way to modern industrial capitalistic agriculture. But without an industrial component, Green Revolution 2 is unlikely to have much of an effect on rural life as compared to the changes that took place after the introduction of tractors and other motor-powered machinery.

Green Revolution 2 still has to show that it can increase potential yield through genetic engineering. One strategy is the attempt to modify the enzyme, known as RuBisCO, that is the principal catalyst for photosynthesis. RuBisCO captures carbon

dioxide and helps to turn it into the carbohydrates, proteins, and fats necessary for life. However, RuBisCO is said to be an inefficient enzyme. It acts slowly and also triggers an additional reaction that interferes with its role in capturing and fixing carbon dioxide. In this second reaction, photorespiration, RuBisCO combines with oxygen, instead of carbon dioxide, which is then converted partly into carbon dioxide. "In other words, RuBisCO catalyzes one reaction that incorporates carbon into plants and another that ultimately strips them of carbon" (Mann 1999b: 315).

The slow reaction time of RuBisCO and its conflicting roles have made it a target for bioengineers who are trying to increase crop yields. Their hopes were recently raised by the discovery of more efficient RuBisCO in red algae. The idea would be to replace the existing enzyme with the red-algae form, or else to manipulate the current enzyme so that its reaction time would quicken. The task would be formidable. It is no longer a question of a single gene but of a large molecule encoded by many genes, and there are other complications. Twenty years of work along these lines have been unavailing. Scientists now speak hopefully of seeing results in about 10 years. Even if the bioengineers are successful, there is no guarantee that their work will benefit agriculture. "Since at least 1970, research has shown little correlation between crops' photosynthesis rates and their yields, suggesting that improvements in RuBisCO won't automatically translate into better harvests" (Mann, 1999b: 316).

Nonetheless, plant physiologists Spencer Whitney and T. John Andrews have recently taken a significant step toward the goal of inserting RuBisCO from algae into plants. Their work is based on engineering the plastid genome rather than the nuclear genome. Plastids are organelles with relatively small genomes that are found outside the nucleus in the cytoplasm. Some plastids, the chloroplasts, contain chlorophyll. Using the techniques of plastid transformation, Whitney and Andrews have replaced the RuBisCO of tobacco plants with RuBisCO from a red alga. Although the introduced RuBisCO is less efficient than the original enzyme, the experiment shows that it is possible to replace a plant's RuBisCO with a foreign enzyme. In this case, the genetically modified organism was fully autotrophic and reproductive although it required additional carbon dioxide because of the inefficient RuBisCO used in the experiment (Gewolb, 2002; Whitney and Andrews, 2001: 14738–14739).

The available transgenic plants are of great potential importance, for they can minimize the loss of crops to pests. Pesticides, which can present ecological problems, are not needed for pest-resistant transgenic crops. Proponents of transgenic plants often refer to the success of genetically modified maize and cotton that are grown on a large scale in the United States. Crop loss is currently estimated at up to 40% in Africa and Asia and about 20% in the developed world. Much such loss occurs after plants are fully grown, which means that all or most of the water and other inputs have already been invested. Water for agriculture is in short supply in many parts of the world (Somerville and Briscoe, 2001: 2217). By reducing crop loss, transgenic plants increase the actual yield, which means that increased food production can take place on the same land area and without an increase in the use of water.

To judge from a multipage series of articles in *India Abroad* on August 4, 2000, many Indians are enthusiastic about the potential of transgenic crops. Under such

headlines as “Seeds of Hope”, “Food for Billions”, and “Commercial Benefits of Growing Genetically Modified Crops”, a host of estimated figures were offered to illustrate future benefits. Padmanabhan mentioned several plants (tomatoes, egg plant, cauliflower, oilseeds, and cabbage) where the benefits of transgenic seeds would be considerable. Padmanabhan noted “In India [in contrast to other countries, especially the United States] even though transgenic plant research—some nearing completion—is being conducted in about 10 plant varieties and hybrids, not a single seed, thus far, has been permitted to be commercially exploited” (Padmanabhan, 2000: 28). However, on March 26, 2002, Indian agriculture reached a milestone when the Government approved the commercial release of Bt cotton (Ganapati, 2002: 32; Kaiser, Holden, and Bagla, 2002: 2345; Suggu, 2002: 32).

Although laws and regulatory procedures vary from country to country, the authorization to offer transgenic seeds in the marketplace is generally strictly controlled. The company that develops such a seed must demonstrate that it is safe for consumption and not environmentally hazardous. At present, there is no clear evidence that anyone has been harmed by a product of genetic engineering. Lewontin (2001: 81) points out that pharmaceutical human insulin is produced by transgenic bacteria and used by a large number of diabetics without adverse effects, and that the dangers of genetically engineered food remain hypothetical. With regard to environmental problems, Marvier (2001: 160) notes a lack of major problems associated with transgenic crops. Nonetheless, there is widespread popular anxiety about the safety of transgenic crops, and there has been at least one troublesome case. “In 1989 . . . a batch of a food supplement derived from genetically engineered bacteria had been implicated as the source of an outbreak of eosinophilia myalgia syndrome (EMS), which killed thirty-seven people and left some 1,500 more permanently disabled. It was never established that the toxicity of the supplement was linked in any way to the fact that it was a product of genetic engineering” (Martineau, 2001: 27). Yet this is the kind of occurrence that heightens public suspicions.

Martineau’s account of the life and death of the genetically engineered Flavr Savr tomato is a fine example of the obstacle course that a company—Calgene in this case—must run to bring a transgenic plant to market. Martineau played a large role in preparing data for submission to the FDA to win its approval. The experimental data were exemplary, and the FDA examined them in exquisite detail. It made many requests for more experimental data, both as a result of its own internal review and in response to comments received from the public. After three-and-a-half years of hard work on the part of Calgene scientists, the FDA finally granted its approval.

What made obtaining approval particularly complicated in this case was not so much the modification of a gene but the addition of a “marker gene”. The Flavr Savr gene was designed to prolong the shelf life of tomatoes. The unmodified gene codes for an enzyme—known as PG, for short—that causes fruit to soften and rot. The original PG gene was replaced by an engineered version that had been “flipped upside down and backward” (Martineau, 2001: 25). The engineered gene gave rise to far less PG protein than is produced by ordinary tomatoes. Therefore, Flavr Savr tomatoes had a much longer shelf life than common tomatoes. A marker gene was used to identify which tomato cells had incorporated the foreign DNA. The gene was resistant

to an antibiotic, kanamycin. Hence, there was the problem of the extent to which consumers would absorb the gene that conferred resistance to kanamycin.

Initially, the Flavr Savr tomato appeared to be a big success. However, Calgene decided that long shelf life was not enough, and the firm's business staff wanted to try ripening Flavr Savr tomatoes in the field and then shipping them to market, thinking that they would withstand transportation because they were firmer than ordinary tomatoes. The first shipping test, 2000 miles in a truck from Mexico to Chicago, was a disaster. The tomatoes shipped from Mexico had turned into tomato puree when they arrived in Chicago. Calgene could make no money with Flavr Savr tomatoes. Calgene was taken over by Monsanto, who knew firsthand how much money could be lost in the tomato business, and the company gave up on the Flavr Savr. According to informed people, genetic engineering was easy compared with reforming the tomato business. At present, there are no genetically engineered tomatoes for retail sale either in the United States or in Europe (Martineau, 2001: 26, 28).

Martineau, whose group was put through the wringer by the FDA, nonetheless supports stringent regulatory requirements although not to the point where a newly born innovative technology is strangled in the crib. The potential is too great. As an example of the life-enhancing benefits of biotechnology, Martineau cited the case of so-called golden rice, which is enriched with beta-carotene, a precursor to vitamin A. Three genes, two from daffodils and one from a bacterium, *Erwinia uredovora*, are inserted into plasmids that occur inside a bacterium known as *Agrobacterium tumefaciens*. These agrobacteria are put into a petri dish with rice embryos. As they infect the embryos, they transfer the genes that encode the instructions for making beta-carotene. The transgenic rice is crossed with locally grown varieties of rice that are suited to local conditions (R. Bailey, 2001: 1; Nash, 2000: 32–33). Beta-carotene is converted to vitamin A in the body. In some rice-producing regions, rice lacks vitamin A. For humans, a diet deficient in vitamin A can cause blindness. Bailey (2001: 1) states that “[golden rice] could prevent blindness in half a million to 3 million poor children a year and alleviate vitamin A deficiency in some 250 million people in the developing world.”

There are caveats. Lewontin (2001: 83) focused on the stage in the process where beta-carotene is converted into vitamin A to enter a mild demurral: The conversion takes place only in the body of an already well-nourished person. Vandana Shiva, a formidable foe of genetic engineering and director of the New Delhi-based Research Foundation for Science, Technology, and Ecology was not so gentle. She raked golden rice over the coals, concluding, “It has yet to be established that genetically engineered rice is not a Frankenfood. Promoting it as a tool against blindness while ignoring safer, cheaper, available alternatives is a blind approach to blindness control” (Shiva, 2001: 3). However despite its alleged faults, golden rice is a harbinger of future discoveries that will be important for nutrition and health.

One of the chief ecological problems of Green Revolution 2 is that transgenic crops could themselves become costly pests or, by hybridizing with wild relatives in some part of their distributions, could create aggressive weeds. In this regard, the introduction of a transgenic plant into the environment is similar to the introduction, either deliberate or accidental, of any nonnative species. Although the vast

majority of introduced plant species cause no serious environmental damage, there are many well-documented examples of "non-native plants, including kudzu and purple loosestrife, becoming aggressive weeds with devastating environmental and economic consequences" (Marvier, 2001: 162).

Some recent experiments show that genes from crops can sneak easily into their wild relatives.³⁵ A jumping gene would not produce a superweed in every case. However, a crop gene that endowed a plant with resistance to viral attack could become established in the crop's wild relative. Alison Power of Cornell University experimented with the effects of the barley yellow dwarf virus on crop oats and wild oats. She concluded, "If you remove the virus . . . it gives a huge advantage to wild oats because they're no longer suppressed." Her results were intriguing, and Power is continuing her studies to determine the actual risks of wild oats becoming an aggressive weed (Kaiser, 2001: 1425, 1427). In the meantime, researchers in China have begun field trials with genetically modified wheat that resists the barley yellow dwarf virus (Huang et al., 2002: 675).

The second major ecological problem of transgenic crops concerns potential harm to nontargeted species. The currently most striking example of this phenomenon is the mortality, up to 44% in laboratory-based research, of monarch butterfly caterpillars that feed on milkweed leaves dusted with pollen from maize with the Bt gene. One hundred percent of larvae survived when fed milkweed coated with ordinary corn pollen. Maize is pollinated by wind, and the pollen can be blown up to 60 m, coating the leaves of nearby milkweed plants. Roughly half of the monarchs in the United States feed on milkweeds in the corn belt during the summer, so the effects of the Bt toxin on monarch populations could be significant. On the other hand, the toxins in transgenic maize pollen could become inactive relatively quickly under natural conditions, and some varieties of Bt maize have low quantities of toxin in their pollen (Marvier, 2001: 163–164). In any case, this is the kind of newsworthy event that generates public anxiety, which often is expressed in political action.

Perhaps the most formidable problem concerning transgenic crops is the militant political opposition that they encounter in some countries. Europe seems especially hostile to genetically modified crops. Britain and France are rated as strongly hostile, and, in 1998, France, Italy, Greece, Denmark, and Luxembourg united to block introduction of all new genetically modified products into the European Union (Nash, 2000: 37–38).³⁶ Switzerland held a national referendum that would ban transgenic research. The referendum was defeated but it made the government cautious about approving transgenic research projects. On November 20, 2001, the Swiss government rejected an application to conduct a field trial of genetically modified wheat. Although the government cited scientific reasons for the rejection, it appears likely that the decision reflected the concern that the experiment would be "politically inopportune". Swiss scientists argued that the decision "... amounts to a de facto moratorium on field tests of any transgenic plant" (Weiss, 2001: 2067). Hostility to transgenic crops in Asia is not so intense as in Europe, but it is noteworthy in Japan and India.

A heated clash over transgenic crops in India took place in the aftermath of a cyclone that slammed into Orissa in October 1999, killing 10,000 people and leaving another 10 million to 15 million people homeless. Relief agencies distributed a

mixture of maize and soybean meal provided by the U.S. Agency for International Development to hungry survivors. The mixture contained some meal from transgenic maize and soybeans. This presumably humanitarian act gave rise to cries of outrage. Leading the charge was Vandana Shiva who said, "We call on the government of India and the state government of Orissa to immediately withdraw the corn-soya blend from distribution. . . . The U.S. has been using the Orissa victims as guinea pigs for GM [genetically modified] products which have been rejected by consumers in the North, especially Europe" (Bailey, 2001: 1).

Proponents of transgenic crops struck back. C. S. Prakash, a professor of plant molecular genetics, pointed out, "Vandana Shiva would rather have her people in India starve than eat bioengineered food" (Bailey, 2001: 1). Per Pinstrup-Andersen, director general of the International Food Policy Research Institute, countered Shiva's accusation against the United States, "To accuse the U.S. of sending genetically modified food to Orissa in order to use the people there as guinea pigs is not only wrong; it is stupid. Worse than rhetoric, it's false. After all, the U.S. doesn't need to use Indians as guinea pigs, since millions of Americans have been eating genetically modified food for years now with no ill effects" (Bailey, 2001: 1). And Bailey (2001: 4) noted, "Today it is estimated that 60 percent of the foods on U.S. grocery shelves are produced using ingredients from transgenic crops."

A similar counterattack was launched against critics of golden rice. The point at issue was the apparent willingness of the opponents of transgenic organisms to sacrifice the health and lives of poor people for their cause. At the annual meeting of the American Association for the Advancement of Science, February 19, 2000, Ismail Serageldin, director of the Consultative Group on International Agricultural Research, challenged, "I ask opponents of biotechnology, do you want 2 to 3 million children a year to go blind and 1 million to die of vitamin A deficiency, just because you object to the way golden rice was created?" (Bailey, 2001: 2).

However, Shiva is by no means alone. There is a strong global movement against crop biotechnology—sometimes called green biotech to distinguish it from medical biotechnology, or red biotech. Bailey lists some 12 antitransgenic organizations and comments that they "have proliferated faster than bacteria in an agar-filled petri dish" (Bailey, 2001: 2). Some of the rhetoric is extreme, as when Benedikt Haerlin, head of Greenpeace's European antibiotechnology campaign is alleged to have "dismissed the importance of saving African and Asian lives at the risk of spreading a new science that he considered untested" (Bailey, 2001: 2). Despite such insensitive pronouncements, scary catchwords (Frankenfoods), and moralistic accusations that biotechnicians are playing "little gods" by intruding into areas where they have no business—or perhaps because of such hyperbole—the movement has had notable successes in recent years, as for example, persuading some American food companies, such as Gerber, not to use genetically modified crops in their products.

Among ordinary people, antibiotechnology is probably sustained more by a sort of collective memory of acclaimed scientific advances that later went wrong than by the arguments of Shiva and others. So far, there has been no significant trouble associated with transgenic crops, but current good fortune does not guarantee a future free of problems. The best example of nasty surprises years down the line is proba-

bly the case of pesticides. Scientists and manufacturers considered pesticides to be free of risk when first marketed in the late 1940s. It took nearly 20 years before their ill effects became apparent (Marvier, 2001: 160, 162). The case of the insecticide DDT is notorious, acclaimed at first and then condemned because of its harmful environmental consequences. But even in this case, one must be careful. When used properly, DDT is a useful chemical for controlling malaria and is still needed. Only agricultural uses have been banned (Roberts, 2001: 195).

After having no more than dipped a toe into an already vast literature, we are inclined to agree with Lewontin:

[N]othing is more productive of food for thought than thoughts about the production of food. The introduction of methods of genetic engineering into agriculture has caused a public reaction in Europe and North America that is unequaled in the history of technology. . . . Even the most judicious and seemingly dispassionate examinations of the scientific questions turn out, in the end, to be manifestoes. [Lewontin, 2001: 81]

It is the ideological passion on both sides of the debate that makes it difficult to decide which claims and evidence have merit and which are unreliable.

In the case of India, there is an element of nostalgia in the opposition to genetically modified organisms. Transgenic plants would deal yet another blow to agriculture as traditionally practiced in India—and in other countries characterized as underdeveloped. It is hard to believe that anyone who has closely observed traditional Indian agriculture before Green Revolution 1 could wax sentimental over it. It was brutal hard work. If Green Revolution 2 can indeed improve the Indian rural economy, however small the increment might be as compared to the revolutionary changes of Green Revolution 1, it should be welcomed. This assumes that by the time transgenic plants are offered to the Indian farmer, all the vexing legal problems will have been resolved and the crops will have successfully passed through the regulatory process.

In contrast to Europe and, to a lesser extent, India, China is seriously committed to plant biotechnology, almost all of which is funded by the government. China is currently developing the largest plant biotechnology capacity outside of North America. Small farmers appear to be eagerly adopting the genetically modified plants, especially Bt cotton, whose acreage has grown from only 2000 ha in 1997 to about 700,000 ha in 2000. Not only has Bt cotton improved production efficiency, thus putting more money in the pockets of small farmers, but it has also improved their health because they reduced the use of toxic pesticides by more than 80% (cf. Carpenter, 2001). In a survey, farmers were asked “. . . if they had suffered from headaches, nausea, skin pain, or digestive problems after applying pesticides. If the answer was ‘yes,’ it was registered as an incidence of ‘poisoning.’ Only 4.7% of the Bt cotton growers reported poisonings; . . . whereas 22% of those using only non-Bt varieties reported poisonings” (Huang, et al. 2002: 676).³⁷

In India, there was no governmentally approved commercial cultivation of genetically engineered plants before March 26, 2002, and only Bt cotton was undergoing field trials. In November, 1998, farmers and activists responded by uprooting and

burning Bt cotton planted in two small trial fields by Maharashtra Hybrid Seeds Co.(MAHYCO), a local affiliate of Monsanto.³⁸ They were especially incensed by the possible introduction of the “terminator gene”, which renders second-generation seeds sterile so that farmers must buy new seeds every year. Monsanto later pledged not to use the terminator gene (Normile, 2000b: 1279). It is unlikely that farmers in the Shanti Nagar region would quietly accept the terminator gene. They practice modern agriculture, but the attitudes and some of the practices of peasant agriculture are much in evidence. One of these practices is to save seed from a particularly good crop, especially tomatoes, for use in the succeeding season. But a caveat is in order: Terminator genes protect the intellectual property rights of the developers of transgenic plants. Undiscouraged, MAHYCO persevered with preliminary trials, and later won governmental approval for large-scale field trials, on condition that the plants not contain the terminator gene.

There was a second episode of destroying Bt cotton, this one by the government and not by farmers and activists. Monsanto carefully protects its patent rights. When MAHYCO, an affiliated company in which Monsanto has a 26% share, discovered genetically modified cotton growing in Gujarat, it complained to government officials, who ordered the destruction of hundreds of hectares of the illegal plants on October 18, 2001 (Gewolb, 2001: 991). New Delhi is serious about enforcing the ban on genetically engineered plants that do not have governmental approval. On the other hand, the incident suggests that there is a market for Bt cotton. Some farmers want it, just as do farmers in China and America. The reason is simple: Bt cotton puts more money in the pockets of Indian farmers.

Herring has described this episode in detail, and the account that follows is based on his Mary Keatinge Das lecture, Columbia University (Herring, 2001). MAHYCO discovered the illicit planting because of a bollworm infestation that hit Gujarat in 2001. The plague was so bad that the healthy Bt fields stood out starkly. Sharad Joshi, president of the farmers' organization, *Shetkari Sanghathana*, wrote:

Through a lucky stroke a nondescript seed company [Navbharat Seed Limited] managed to play Robin Hood and smuggle into Gujarat one line of anti-bollworm gene. For three years nobody noticed the difference and then came the massive bollworm rampage of 2001. Gujarat saw all its traditional hybrid cotton crop standing devastated, side-by-side the Bt-gene crops standing resplendent in their glorious bounty. The Government was upset and ordered destruction and burning of the bountiful crop. [quoted in Herring, 2001: 22–23]

What happened in Gujarat was an illicit version of a standard governmental method used to convince farmers to adopt a new cultivar. Demonstration fields are planted in villages where farmers can compare yields. The “demonstration fields” in Gujarat effectively showed a great advantage of Bt cotton, namely, relative safety from financial ruin. Moreover, Bt cotton is much more profitable than traditional varieties, and farmers “. . . had been voting with their plows beneath Delhi's radar screen . . .” (Herring, 2001: 20–21, and notes 15, 17, quote on p. 20). In public rallies, leading farm-

ers challenged the Government: Sharad Joshi said, "Development should not be locked up in the cities. The marvel of technology should reach the villages." Bhu-
pendra Singh Mann, president of the *Bharatiya Kisan Sangh* (Indian Peasant Association), said, "Give us these seeds and we will sow it [sic] in our fields in Punjab. The cotton crop that we have seen here [Gujarat] is fantastic." The president of the *Khedut Samaj* (Farmers' Society) in Gujarat, Vipinbhai Desai, said, "We have tested the seeds. This is the third yield using Bt cotton seed. The government says it is hazardous. If that is so, why are they not proving it scientifically" (quoted in Herring, 2001: 22, 23 note 25, 24).

The farmers had turned the tables on the Government. Governmental policy is that biotechnology companies must prove transgenic seeds to be effective, safe for humans, and environmentally harmless. The farmers told the Government that events in Gujarat had proved the effectiveness of Bt cotton and that there had been no problems. They challenged the Government: if Bt cotton is dangerous, prove it scientifically. Although New Delhi was probably on the verge of approving Bt cotton anyway in order to bring the yield of cotton up to the global average and to protect her share of the world's cotton markets (Ganapati, 2002: 32), the plantings in Gujarat may have been the last straw. On March 26, 2002, India's Genetic Engineering Approval Committee approved the commercial production of some varieties of Bt cotton, with conditions, and indicated that it may later ease restrictions on other transgenic crops barred because of worries about their impact on the environment. Kaiser et al. (2002: 2345) reported the conditions:

Farmers have been given a 3-year pass to plant three Bt cotton varieties developed by the Maharashtra Hybrid Seeds Co. (MAHYCO) in Mumbai. Under the new rules, farmers must plant at least 20% of any GM field with non-Bt varieties and surround them with five rows of non-Bt plants. MAHYCO must also report insect resistance and track annual GM seed sales. Monsanto, which imported the Bt gene, owns a minority stake in the company.

This condition of mixing Bt and non-Bt varieties in the same field is a variant of "refuge planting", a strategy designed to slow the evolution of Bt-resistant pests. Nonetheless, "[E]nvironmentalists say the government's decision is premature. Pests are 'bound to develop resistance,' says Devinder Sharma, a food policy analyst with the Forum for Biotechnology and Food Security" (Kaiser et al., 2002: 2345).

From the perspective of Shanti Nagar, tomatoes might be the next approved transgenic plant. In 1978, a bollworm infestation reduced the value of the village tomato crop by 30%. We spotted a field of healthy tomatoes and asked the farmer how he did it. He told us that he had removed the infected tomatoes by hand which stopped the bollworms. A transgenic tomato would be attractive to such a farmer—provided that consumers would accept it. It would save him hours of drudgery. Activists seek the outright ban of GM crops, or at least interminable delay, which would only impoverish or even bankrupt farmers who would be forced to depend on pesticides. Herring notes, "A related issue is the effectiveness of pesticides; there is

much fraud in selling farmers expensive chemicals that do not work. These faulty products were implicated in the wave of farmer suicides of such importance to the anti-GMO movement in 1998" (Herring, 2001: 21, note 17).

Harbaksh Singh Nanda reported a case, presumably typical, of the almost 400 farmer suicides in Punjab from 1996 to 1998.

Mohinder Singh, 30, owed about Rs. 250,000 (\$5,952) to local commission agents and other moneylenders for loans he had taken to rent nine acres of land on contract. The cotton crop he had planted in at least seven acres of the land had been damaged in an attack by American bollworms and other pests. Devastated by the crop failure, Singh felt he had no other option but to end his life. He is survived by his 27-year-old wife and children. [Nanda, 1998: 8]

Bt cotton would have stopped the bollworm, the major pest.

For India, there is more at stake than farmer bankruptcies or suicides, as distressing as they may be. If the activists carry the day, India will be a marginal player in what currently shapes up to be one of the leading sciences of the 21st century (cf. Herring, 2001: 33). India has the third largest cadre of scientists and technicians in the world and will soon be the world's most populous country. It is almost inconceivable that India will choose to sit on the sidelines, ceding to North America and China a field where she could be a leader.

There is nothing on the horizon that is going to stop the continued technological development of Indian agriculture and all that goes with it. India's population continues to increase, and sooner or later more food will be needed. Green Revolution 2 offers the strong likelihood of more bountiful harvests by narrowing the gap between actual and potential yields and perhaps, in the next decade, the possibility of increasing potential yields. To judge from the recent past, agricultural development leads to greater wealth and an easier, more pleasant life in the countryside. Nostalgia has its charms, but wealth and comfort trump poverty and backbreaking labor every time.

A key question is whether Indian farmers will accept other transgenic crops in addition to Bt cotton. They will, provided their well-known propensity for risk aversion can be mollified, and they can make more money and/or simplify their farming. The calculation will not necessarily be simple. Monsanto and similar companies have adopted a strategy of "product complementarity". For example, the herbicide Roundup is one of Monsanto's flagship products. To protect its market share, Monsanto developed soybean, maize, and cotton varieties that are resistant to Roundup (Damodaran, 2001: 2). Thus, the herbicide can be used on a field without killing the plants to be protected. Bayer used a similar strategy involving its flagship herbicide Sencor. Farmers who want to use Roundup on their cotton fields, must buy Roundup Ready Cotton. Concerning the reaction of American farmers, Lewontin (2001: 84) comments, "The farmers accept the cost of the new variety and its chemical partner because the use of such a powerful general weed killer will reduce the number of herbicide treatments or mechanical tillage passages through the fields, freeing them for the hours in the automobile assembly plant that they need to keep their farms."

Lewontin may be right as regards America where farms of several hundred acres are common. In the Corn Belt, most farms are family operated and average more than 300 acres. It is not at all certain that his conclusion would be applicable to the Shanti Nagar region, where a farm of 20 acres is large. Mechanization, large families, and internal migration that brings cheap labor from Bihar into the Northwest are what free men for urban employment. Heavy inheritance taxes on family farms, which are a problem for the American family farm, do not exist in India. Complementary plants and herbicides would be attractive only if they increased yields or offered protection from a major crop failure. The context in which a farmer operates is as important as the intrinsic qualities of a new variety.

Indian farmers are willing to try a new variety, but it has to perform as advertised. Hybrid rice is a case in point. Rice breeders have until recently been unable to take advantage of an effect called hybrid vigor, the fact that the first generation of a cross of two different varieties grows more vigorously and produces more grain than either parent. The problem with rice is that it is self-pollinating, and producing hybrid rice was commercially impractical. However, after three decades of effort, a commercially viable method of producing hybrid rice seed was achieved. The new variety increases yield by 30%. It currently covers about 50% of the rice acreage in China. In recent field trials in the United States, hybrid rice returned an average yield 33% greater than a variety of the farmers' choice. As a result, according to the president of the company that ran the field trials, every one of the participating farmers bought the new seed to use the following year (Normile, 2000a: 429).

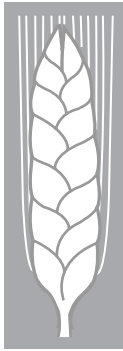
It seems to have been a different story in India. Hybrid rice was recently being planted commercially on some 150,000 ha, but a small sociological study indicated that farmers were disappointed because the harvests often fell short of projected yields. Most farmers did not plan to plant hybrid rice again. Proponents of the new varieties admitted that they require more work and that their quality and taste need improvement (Normile, 2000a: 429). The problems of hybrid rice may eventually be resolved, and it then could be sold to Indian farmers using, among other strategies, the effective method of demonstration plots in the villages.

At present, there would seem to be no integrated theory or hypothesis that has general predictive value concerning the decisions made by Indian farmers when considering a new cultivar, other than the obvious, but unweighted, factors of risk avoidance, cost, productivity, price, and the use to be made of the crop. In a well-executed study of a small sample of farmers in Karnataka, Damodaran appraised the "Dekalb hypothesis" proposed by the Dekalb Genetic Corporation, which states that a year of low commodity prices will increase the interest of farmers in crops that will give them premium prices. The hypothesis is based on farmers in America. A Dekalb product manager said, "In a year with low commodity prices, we are finding there is a lot of farmer interest in a product that gets them a 25-cent premium over today's \$2 corn. . . . If corn were \$4 today, the premium would not loom so large" (Damodaran, 2001: 10, note 4).

Damodaran thought that the Dekalb hypothesis might hold in developed countries but not necessarily in India. He investigated it among farmers who grew coffee, finger millet, and watermelons. He found that coffee growers chose another option

in face of a sustained fall in prices during two seasons. Rather than switch to a high-quality, premium variety of coffee, they chose a low-premium variety which could be cultivated at lower cost. The growers of finger millet were indifferent to high-quality cultivars regardless of price because the crop was grown mainly for subsistence. Only the watermelon growers behaved according to the Dekalb hypothesis. Although the exotic varieties were less productive and incurred higher costs of production than the local hybrids, their prices were higher and, more importantly, more stable. Thus, risk aversion and premium prices were predominant for watermelons; cost of production for coffee; and the use to be made of the crop for finger millet (Damodaran, 2001: 5–6).

All the many factors involved in the decisions of Indian farmers might be worked into an equation with significant predictive value, but the calculus would probably be complicated and, in any event, have to be adjusted for each region and different crops. Watermelons are not coffee. Sometimes it is simpler just to deal with the particular context.



CHAPTER SEVEN

SUMMARY AND CONCLUSION

SINCE INDEPENDENCE IN 1947, India has undergone two transitions of profound importance. One passage has been from a hierarchical society to one that strives for equality and practices democracy. Traditional India, with its caste system in full flower, was the epitome of a hierarchical society. Castes are named endogamous social groups in which membership is acquired by birth. The castes of a village—or a region—form a hierarchy based on social esteem and precedence. Although those at the bottom of the scale no doubt disliked the system, it was accepted by all participants, for there was no competing alternative. Now there is one. Equality is in conflict with hierarchy.

The second transition is usually termed modernization, which in India is overwhelmingly westernization. The Government of India has pursued modernization intensively, and the years following Independence were a period of strong influences emanating from Delhi, as the Government designed programs intended to change, even revolutionize, village life economically, technologically, and socially. In addition, the occupational, educational, and recreational opportunities available in Delhi, a city then experiencing rapid modernization and westernization, were as effective as governmental programs in effecting change. The two transitions are, of course, related. Modernization involves Western-style social systems, prominently including democracy. There are elections from the national level down to democratically elected village governments. In an effort to jump-start equality and democratic participation, the Government reserves places in the governing councils of villages, known as panchayats, for women and Dalits (Harijans).

Modernization has essential economic aspects, among them the Green Revolution of the mid-1960s. The phrase *Green Revolution* covers a variety of agricultural innovations—high-yielding varieties of food grains, land consolidation, private tube-well irrigation, mechanization, and factory fertilizers and pesticides—whose overall effect was to transform traditional Indian peasant agriculture into modern mechanized commercial agriculture. The origin of the Green Revolution was not in India but in Mexico, where scientists, most prominently Nobelist Norman Borlaug, developed high-yielding dwarf varieties of wheat. Indian officials, especially C. Subramaniam, who served as minister of food and agriculture from 1964 to 1967, recognized the potential of dwarf wheat and worked to establish a system of governmental

support that made it attractive for Indian farmers to cultivate it. Subramaniam also reorganized Indian agricultural research, and today it is world-class. The immediate results of the Green Revolution were spectacular: substantially increased production from the new grains, usually two or three times the yield of the traditional varieties, and greater prosperity for farmers.

Although the introduction of high-yielding varieties of wheat into Shanti Nagar increased the revenue of farmers, the wages of landless agricultural laborers did little more than hold their own, increasing at no more than the rate of inflation. However, the great expansion of vegetable cultivation, especially tomatoes, augmented considerably the income of landless people. Although wheat retained its position as the chief village crop, tomatoes replaced sugarcane as the principal cash crop. Growing tomatoes was only loosely connected to the Green Revolution, principally to the large number of tubewells needed for the exploitation of the dwarf varieties of wheat. Tomatoes require a small amount of water weekly during the growing season, and tubewell water is more dependable than canal irrigation. Tomatoes are harvested and taken to market every few days during a growing season of several months. They are labor intensive and a perfect crop for family labor. A big landowner could handle little more than a couple of acres of tomatoes and so found it profitable to rent land to landless people who then grew tomatoes on their own behalf. In short, many landless people no longer had to work full-time as laborers but became instead agricultural entrepreneurs. Thus, a landless man contracting for a field of tomatoes dealt with a landowner as one businessman to another on the basis of quasi-equality. Caste status was irrelevant. It was a case of two businessmen making a deal.

The Green Revolution directly affected agriculture. New crops replaced traditional varieties, and factory fertilizers were widely used to maintain the fertility of soil that was being farmed more intensively than in prerevolutionary times. Factory-made power-driven equipment, especially tractors and threshers, displaced traditional implements, such as wooden plows and winnowing baskets, made by village artisans. Work in the fields was easier and faster, and the crop cycle was compressed.

The Green Revolution indirectly affected animal husbandry. No new breeds of cattle were generally introduced, although crossbreeds were available through the Government, nor did any new machinery appear on the village scene for lightening the work spent in processing milk. But tractors, whose primary use was for plowing, replaced bullocks, which had the secondary effect of checking the growth of the herd of zebu cows. Although the buffalo herd had increased, the stable number of zebu cows and the greatly reduced bullock population meant that there was less dung than might have otherwise been available. Dung was indispensable for cooking and was also an important fertilizer. As a result of the relative shortage of dung, some farmland had to be diverted to raising crops that could be used as fuel.

Developments in education, employment, health services, and various social programs took place at the same time as the Green Revolution. Although not usually called a revolution, these advances deeply affected social relations. Education opened the door to steady, generally well-paid jobs in the city. Many families benefited, but especially low-caste people because of reserved places in government employment for Harijans. Salaried urban employment was the ticket out of poverty

for some low-caste people, which in turn broke their dependence on the landowners. The status of individuals has come to depend noticeably on secular criteria, such as education, employment, and wealth, as well as on caste membership.

We have tested several theories against the ethnographic facts and found most of them of little value. The "bipolar moralistic model" is too simple to deal with the intricate nexus of economic links, official and traditional law, governmental programs, and communication that integrates Shanti Nagar into the region, nation, and the world. Chayanov's definition of peasantry as a type of society based on the family farm and worked by family labor is useful but limited. It is not much help in dealing with social change, for the family farm is not incompatible with modern industrial farming although, largely for financial reasons, it probably operates at a disadvantage in competition with industrial farming by large corporations.

"Dependency theory", or "world systems theory", argues that the world capitalist system exploits and impoverishes peasants. They are driven into debt, lose their land, and sink into the rural landless proletariat where their labor is exploited by large landowners. This has not happened to a significant extent in the North Indian heartland of the Green Revolution. A major weakness of dependency theory is the assumption that external factors are all-powerful and the peasants are passive victims. In fact, the first step that one must take in studying "peasants" is to disabuse oneself of just such notions. Peasants do a quite adequate job of analyzing situations, identifying their interests, and taking care of themselves. Some of the sharpest people we have ever met are "peasants".

The basic idea of "modernization theory" is willing imitation rather than the malevolent manipulation of dependency theory. Developing countries are said to imitate Western economic and political arrangements, eventually to become developed nations. However, modernization theory is too simple to handle the intricate social and economic situation that one encounters on the ground. New technologies and artifacts are often modified and reinterpreted to fit a new context. The example offered above concerned the tractor, but perhaps a better example would be land consolidation in India and France. Although imitation was not involved, this comparison shows how similar programs with the same basic goal may evolve quite differently in different societies.

Like dependency theory, the "standard theory" of commercialization forecast riches for the few and poverty for the many. Its proponents expected that the Green Revolution would engender such massive social disruption that the Green Revolution would end in a "red revolution". Nothing like that happened in India. Everyone did better for various reasons. There was a general increase in wealth, the availability of food at affordable prices, health, education, equality, and comfort. Problems still abound. Too many people live in poverty, not so much in northwest India, the heartland of the Green Revolution in wheat, but elsewhere in this vast and varied country, in Bihar, for example. But the Green Revolution has done what the Government of India hoped that it would do.

"Path dependency" theory, closely related to "complexity" theory, is probably the most useful approach to cultural persistence and change because it emphasizes factors internal to a given system. However, path dependency does not permit

prediction because the path of development is often strongly affected by “perturbations”—circumstances external to the system. Thus, the system is seen to be extremely context dependent. To understand best the evolution of a given system, functionalism must be brought into play. Functionalism greatly broadens the cultural and social context used in the analysis of a given system. Such a wide-ranging approach lacks the intellectual tidiness of some of the other theories that we have considered—which can be achieved only by reducing complicated social phenomena to the bare bones—but in the end, it leads to the deepest understanding.

Land consolidation in India and France well illustrate the importance of cultural context, social philosophy, demography, history, and environment on the different outcomes of comparable projects for improving the productivity and efficiency of agriculture. The initial situations and the desired goals in both countries were similar. In both countries, the fields of farms were fragmented. The desired goal in each country was to reorganize the fragmented fields into farms most of whose fields adjoined one another. In northwest India, the process was relatively straightforward and successful. The major perturbation was the connection of land reform with land consolidation in an effort to enhance social equality. In France, the program was much more tortuous. It has blossomed into a large-scale, increasingly complicated program of rural development that features social goals far removed from a simple reorganization of fields. It has become a program for the multiple exploitation of rural space for the benefit of all users—not just the farmers. Moreover, it aims at solving certain demographic problems associated with agriculture that have no analogue in India. On the other hand, it is not concerned with social equality, which is so prominent in the Indian program. In the Vaucluse, land consolidation has not advanced very far as of this writing. In short, two similar programs in different countries followed dissimilar paths and have had largely different outcomes. From the point of view of theory, one could almost say that cultural, social, and historical context are the theory.

Agriculture in northwest India has largely passed through a transition from peasant agriculture dominated by subsistence farming to modern commercial agriculture. Machines powered by electricity or the internal combustion engine, which have replaced bullock power, and the financial infrastructure that enables farmers to buy them, represent a fundamental change. If the Green Revolution is understood in its broadest sense to include much higher educational levels and new employment opportunities, then the economy of Shanti Nagar, whose principal component was still agriculture, was a different enterprise in the 1970s than in the 1950s. Aside from some activities that have not changed appreciably, such as animal husbandry, the people of Shanti Nagar now lead a modern style of rural life supplemented by urban employment. Moreover, modern agriculture, education, and salaried urban employment have enhanced equality, one of India's greatly desired social goals. The Green Revolution and its associated changes have been truly revolutionary.

What has become of Shanti Nagar at the turn of the century? Dinesh Sharma, a psychological anthropologist, has visited the village several times since our work there, most recently in November 2001. He reported (letter, March 6, 2002) a con-

tinuation of earlier trends. There is now hourly bus service between Shanti Nagar and Delhi, which generates increased commuter traffic to and from the city. The habitation site continues to spread to accommodate a growing population. The new houses are urban in style and construction. A tender has been offered to improve the roads in the region, and the Government wants to build another train station on the line that runs a mile or two to the east of Shanti Nagar. The Government is also planning to build an industrial park for multinational companies. The village school and other schools in the district have been improved.

Though fertility has declined significantly, so has mortality, with the result that the population of Shanti Nagar appears to have increased more in the approximately 20 years between our research in the 1970s and Sharma's in the 1990s than it did in the 20 years between our studies in the 1950s and in the 1970s. During the earlier 20-year period, the population increase was about 66%; during the later period, the population more than doubled and the number of families doubled. In recent years, about 3000 people and 350 "households" inhabited Shanti Nagar (Sharma and LeVine, 1998: 47).

Trends in education and salaried employment have kept pace with the population increase. Education and outside employment are increasingly necessary for a family's economic well-being. Sharma wrote:

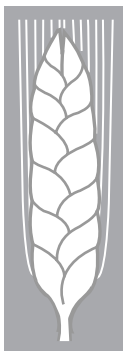
Unlike a generation ago, it was evident that a young person living on the family land and the family's wealth could not survive without acquiring additional income given the inflation in the prices of household goods and the scarcity of resources, which even included the village land. . . . Parents in Shanti Nagar recognized that they could no longer rely entirely on an agrarian lifestyle to support their families. Due to the increasing shortage of land and the high cost of labor, incomes had to be supplemented with outside work. This was impressed on their children from a young age as they were repeatedly told that they ought to become professionally trained as they grow up. Young children in Shanti Nagar witnessed their siblings going to school in unprecedented numbers. Some of the mothers saved money to send children to private tutors to provide additional instruction. [Sharma, 2000: 237]

Land becomes short as population increases. There is no way to increase significantly the area of agricultural land in Shanti Nagar, and it even shrinks a little each time the habitation site has to be enlarged. Necessary family income therefore must come from outside employment, which, in turn, requires education for the better jobs. Education is increasing for both men and women. However, the educated woman, whatever may be her earning capacity, falls a bit short in the critical eyes of older women. Sharma wrote:

[Grandmothers] often complained that mothers of this generation do not participate in household work as had the previous generation. The new mothers are too educated and think too much, said many of the

grandmothers. In the older days, we used to bear and raise many more children and still had time to do all the household work; these days the mothers are too fragile to do anything. [Sharma, 2000: 234]

Much of the change that has taken place in Shanti Nagar has been beneficial. In the 1970s, we felt little nostalgia for the village of the 1950s because the villagers themselves had not changed. They were as gracious, friendly, helpful and hard-working as ever. The key to a better life—as the villagers well know—is to accept the useful developments that come from the Government and from abroad and to reject ill-conceived programs and seductive vices. Realistic and resourceful, villagers are quite capable of taking care of themselves; and in so doing, they represent the stability and strength of the country.



APPENDIX

TRANSCRIPTION OF HINDI WORDS AND NOMENCLATURE

WE HAVE USED the Romanized spellings without italics of all Hindi words contained in *Webster's Third New International Dictionary, Unabridged*. Unitalicized words also include proper names and commonly used terms, such as *lambardar*. Other Hindi words often used in English publications, whose spellings have become more or less standardized, are italicized and given in their customary form without diacritics (e.g., *biradari*). English plurals and possessives are used (e.g., *kunba*, *kunbas*) except when *Webster's* gives the Hindi plural. Brief definitions of all Hindi words are given in the "Index and Glossary". Fuller definitions can be found in the text, usually the first time that the term is mentioned.

The spelling of Hindi words written in English is sometimes a problem because of differences between common usage on the one hand and a linguistically correct transliteration on the other. For example, *pukka* (pure, solid) could be written either as *pukka* or *pakkaa*. We use Webster's unabridged dictionary as our standard. Thus, *pukka* is the indicated spelling. *Pakkaa* (or *pakka*) is not even listed as an alternate. However, the linguistically correct transliteration of the word is given in the etymology. Thus, the reader can look up *pukka*, but not *pakka*, and also find the Hindi and the Sanskrit.

Binomial designations are used for castes. The first word is the usual Hindi name for the caste; the second, an English word that denotes the traditional occupation of the caste and/or translates the Hindi term. For example, the English translation of *Nai* is *barber*, the traditional occupation of the caste: hence, *Nai Barber*. *Jat* does not mean *farmer* in English, but the *Jats* are traditionally farmers: hence, *Jat Farmer*. There were two castes of potters (*Kumhars*) in *Shanti Nagar*, the *Gola Kumhars* and the *Mahar Kumhars*. To avoid the use of a cumbersome three-term name, we designate the castes as *Gola Potter* and *Mahar Potter*. When the same caste is mentioned successively, we frequently shorten the name following its initial use to either its Hindi or English component. The English word used as a caste designation is capitalized. When not capitalized, words such as "potter" and "farmer" refer to occupations and not to castes. For example, "Jai Kishan was one of only two *Gola Potters* who were potters" (implying that the rest followed other trades).

MONEY AND MEASURES

On April 1, 1957, India introduced the decimal system into currency and coinage. The change from the traditional system to the decimal system took several years to complete, and during our first residence, both systems were in use. In the traditional system, the rupee, the basic unit of currency, is divided into 16 annas. An anna is divided into 12 pies, three of which equal a pice. Initially, annas and pies were changed into *naya paisa* (new paisa). On June 1, 1964, when new coins were in abundance, the old coins were totally withdrawn and *naya paisa* was changed to paisa. In the decimal system, the rupee is divided into 100 paise (Delhi Administration, 1976: 390). At the time of our second visit, only the decimal system was in use.

An American can best appreciate the value of the rupee in Indian villages by equating it to a dollar, an equation which probably understates the rupee's value in the village context. We are disinclined to use the exchange rate to establish the rupee's value in rural India, not so much because the rate varies but because it tends to mislead the reader into underestimating the rupee's purchasing power (S. Freed and R. Freed, 1978: 12). In the 1950s, Rs. 150 per month was a good salary for a villager; in the 1970s, the comparable figure was perhaps Rs. 600. It is our impression, based on a few other key figures, that the purchasing power of the rupee of the 1950s was about three or four times that of the rupee of the 1970s. Thus, a maund of wheat in the 1950s cost Rs. 16; in the 1970s, Rs. 50. Agricultural day labor paid Rs. 1.50 in the 1950s and from Rs. 6 to Rs. 8 in the 1970s.

The traditional system of weights had given way to the metric system by the 1970s. The basic unit of weight in the traditional system is the seer (0.93 kg, 2.06 pounds) divided into 16 chattaks. One chattak equals five tolas. A maund (37.3 kg, 82.3 pounds) is equal to 40 seers. In the 1950s, agricultural yield was customarily given as maunds per bigha; the price of agricultural commodities was usually quoted as rupees per maund. Although villagers spoke of kilograms and quintals in the 1970s, they retained the maund of the traditional system, expressing it however as 40 kg rather than 40 seers. The conversion was easy, for the kilogram is approximately equal to the traditional seer.

The situation concerning areal measurement was a bit complicated and is discussed at greater length in the section dealing with land consolidation. In the 1950s, the basic unit was the bigha (1 acre = 4.8 bighas; 1 ha = 11.86 bighas). The bigha is divided into 20 *biswas*. The bigha and *biswa* were still being used in the 1970s. They were convenient for use in the village habitation site, the compact area containing the buildings, where plots were small, especially those that resulted from the division of village common land.

The most frequently mentioned unit of agricultural land in the 1970s was the standard acre or *kila*. " 'Standard acre' means a measure of area convertible into ordinary acres of any class of land according to the prescribed scale with reference to the quantity of yield and quality of soil" (Aggarawala, 1956: 562).

The Government of India, Department of Agriculture, reports that under the *annawari* system the standard acre in Haryana and Punjab was as follows:

Thus, a 16 annas acre was a standard acre and was defined as an acre of land whose average settlement yield is 10 maunds or more but not exceeding 11 maunds of wheat or other equivalent produce. The scale moved by half an anna for every increase of one maund, the maximum increase permitted being two annas. Value fell by two annas per maund in the scales between 10 annas and 16 annas. In the scales between 10 and 6 annas, the decrease was one anna per maund and below 6 annas there was a decrease of one anna for every half a maund. [India, 1972: 24]

Delhi Union Territory generally follows Punjab and Haryana in such matters.

Bonner (1987: 27) writes, "A farmer who owns one acre of the highest quality land in one part of the village might be entitled to two acres of land valued at half the value of the high quality acre, and so on."

Kila can also mean ordinary acre, but in the 1970s, villagers usually meant standard acre. The *kila* as standard acre is not a pure geometric measure but rather is based on the quality, and hence the productivity, of land. The main advantage of the *kila* in the study of the village economy is that it is an economic measure. Thus, two men with five standard acres might not have the same amount of land as measured geometrically but they have landholdings that are potentially equally productive. On the other hand, a comparison of equivalent geometrical areas measured in bighas in the 1950s meant little in terms of their relative productivity.

NOTES

PREFACE

1. The Indian Corps took part in most of the ferocious battles of 1914 and 1915 and was severely mauled by the Germans. After fourteen and a half months, very few of the original contingent remained. The Indian Corps was withdrawn from France, broken up, and units distributed to other theaters. Most were sent to Mesopotamia, where Indians distinguished themselves during the legendary 147-day siege at Kut-al-Amara and afterwards as captives of the Turks (Farwell, 1989: 248–266).

French citizens have erected numerous memorials honoring the soldiers of various armies who fought for France in World War I. Several of them are dedicated to Indian soldiers.

One of the bigger such monuments lies at Neuve Chappelle. The beautiful monument occupying nearly half an acre along a departmental highway has a huge pillar along which two tigers sit, signifying the Indian forces. The pillar also contains religious inscriptions in three languages—Sanskrit, Urdu and Punjabi. [Nayar, 1998: 15.]

Another memorial is at La Chappelle. Annual celebrations, lasting almost a week, are held at such memorials.

2. The United States Census, 2000 reported 298,000 self-identified Navajo. The Navajo Nation reported 230,000–250,000 members. See United States Department of Commerce News. Internet address: <http://www.census.gov/Press-Release/www/2002/cb02cn56.html>. See also Profile of the Navajo Nation. Internet address: <http://www.nnwd.org/nnprofile.htm>. April 15, 2002.
3. On this point, Farwell comments:
[Districts were] administered by district officers, often remarkably young men, numbers of whom were seconded from the Indian Army. Many exercised enormous powers, and if they were conscientious, as most of them appear to have been, they came as close to knowing and understanding the people of India as was possible for a European. In a culture where power was customarily used to bilk the peasants, an honest British administrator—and nearly all were honest—often took on demigod status and was looked up to as the “supreme incarnation of power, wisdom, and goodness.” [Farwell, 1989: 19]

INTRODUCTION

4. Shanti Nagar is located slightly more than 10 miles in a straight line from the Old Delhi Railroad Station, a point of orientation for measuring distances from Delhi (Nangia, 1976: 1, note 1).
5. Throughout this work, the word cattle designates both zebu cattle and water (or domestic) buffalo.
6. Mankekar (1999) offers an interesting analysis of some of the political and additunal effects of television. Johnson (2000) studied the effects of television in ethnographic context in a village in Maharashtra, a style of research similar to our work in Shanti Nagar. Among his conclusions are that “Maharashtrian villages have leaped from the stage of oral communication into the electronic age of mass communication”, that “[Western style] consumerism . . . is rapidly becoming an accepted

part of the culture of rural Maharashtra”, that Hindi and English have begun to exercise “linguistic hegemony” because of Hindi serials and movies along with the multitude of English programs on satellite television, that cosmopolitan life is increasingly serving as a model for village society, and that gender relations are changing (Johnson, 2000: 191, 194, 195, 196–199).

1: LAND AND MODES OF CULTIVATION

7. After consolidation had been completed, the Government gave booklets to landowners specifying their landholdings. One landowner showed us two booklets that he had obtained from the patwari, the village accountant. One booklet contained data from the *Khewat Khatauni*, the book of land ownership. The other contained data from the *Khasra Girdawari*, the record of cultivation. Both booklets dated from 1973 and were based on the land consolidation of 1971. The landowner's holding was identified by *khewat* number, but a *khewat* refers to a landholding unit and does not identify specific fields belonging to an individual. The fields of a particular landowner and their location are given by the process of rectangulation and are recorded in the landowner's booklet. Thus, each field is located in a particular rectangle and a particular *kila* of that rectangle. The size of the field is given and also a drawing of it with the dimensions of each side. In addition to the area, the *Khewat Khatauni* gives the land revenue and the evaluation of each field in terms of the *annawari* scale. The *Khasra Girdawari* contains dated entries concerning the cultivation of a landowner's fields. The landowner's booklet that we examined noted the important information that the land was self-cultivated. Thus, it could not be claimed by anyone under the land reforms act.

The best discussion of the complicated matter of patwari records, as they were before land consolidation, has been published by Lewis (1958: 337–347).

8. The comparison of Shanti Nagar and Peyrane in the 1950s cannot be applied to the whole of the two countries, especially at different times. According to the *Statistical Outline of India, 1992–93* (Tata Services Limited, 1992: table 212), the yield of wheat per hectare in France in 1990 was three times that of India. However, nationwide statistics are not necessarily valid in specific situations, and conversely a particular case may not hold for a larger region or a country. Moreover, the bases of the calculations were different: the *Statistical Outline* deals with yield per hectare; our comparison is based on the return from seed.
9. In the shift from land consolidation to comprehensive rural development, France may have been a bit ahead of its time, but this development has become a general trend, at least in Western European countries.

[I]n most countries, the accent of LCPs [land consolidation projects] is shifting towards programs that give emphasis to the integrated development of rural infrastructures, environment and landscape. Agriculture is no longer the only sector involved and is, in many cases even a minor partner. . . .

[I]t was only after the Second World War, with the experience of food scarcity in mind, that government programs of land consolidation were set up in most Western European countries. . . . [A]nd in the 1960s and 1970s a large number of projects were executed. It was only in the 1980s, with growing concern over environmental degradation of rural areas, that decision makers became aware of other issues in rural planning; then the exclusive agricultural goals of LCPs began shifting towards multipurpose tools for the sustainable development of rural

- areas, including measures of environment protection and scenic values. [Huylenbroeck, Coelho, and Pinto, 1996: 297–298]
10. Gifts of land were made but were handled by wills rather than being recorded as such in the patwari records. We have one such case. The details cannot be discerned in the patwari records, but they were described by one of our best informants. A plot of land, 1.1 bighas, was willed to a woman who lived in a neighboring village. She was the daughter of a family priest. The Brahmans of Shanti Nagar decided to give him a present. The land was joint *pana* land. A *pana* is an area of the village habitation site inhabited principally by the families of agnatically related males (S. Freed and R. Freed, 1976: 36).
 11. This monthly interest rate corresponds to a yearly rate of 18.75%.
Dewey (1978: xxi) wrote, "The moneylender's 'vicious system' attracted a fair number of pejorative adjectives; but when his functions were expounded it was difficult to see exactly what he is doing wrong. . . . [His] capital was a reserve on which peasant families drew in time of [need]. . . . Besides his function as insurer, the moneylender also provided working capital for the cultivator and, arguably provided it *cheaply*. . . . Darling did not consider [interest rates] excessive, considering the risk of loss and the trouble of collection."
 12. With regard to interest-free loans, Darling (1978: 183) comments, "An appreciable amount is also borrowed from relations and friends without interest. . . . Then there are many [tenants] who borrow from their landlords, usually at 18.75 per cent [the yearly rate calculated from a monthly rate of one pice per rupee], but often at 12 per cent or even at no interest at all."
 13. Darling distinguishes between high indebtedness and heavy indebtedness. High debt refers to its absolute size. Heavy debt is the ratio of debt to the resources of the borrower. From an analysis of data collected from 42,000 proprietors, Darling shows that "the larger holder is more *highly* indebted [owes more money] than the smaller. . . . [But] the smaller proprietor is more *heavily* involved [has committed a greater proportion of his assets as security]. . . . It is evidently much harder for the smaller proprietor to remain solvent than for the larger, and . . . it is only possible if he is exceptionally industrious or has some extraneous source of income . . ." (Darling, 1978: 11–12).
 14. There was some ambiguity in the records, or in our translation; the per acre cost could have been \$391 or \$966 per hectare. Note that the figures given here are slightly different from those published in S. Freed and R. Freed (1978: 27–28). The reason is that in the 1978 publication, the incorrect figure of 4.75 bighas per acre was used. The correct figure, 4.8 bighas, was used in the present calculations.
 15. Our discussions of land laws are based on the interpretations of villagers rather than on the laws themselves. Land law in northwestern India is a vast and complicated subject. Only an attorney with a specialty in land law could understand it. Moreover, a legal historian would probably be needed to interpret the current legal system in the Union Territory of Delhi, for the present Union Territory was part of the Delhi District of the Punjab until 1912, when a separate Delhi Province was created from the Delhi District. Delhi Province became a Part "C" State in 1952 and a Union Territory in 1956. Punjabi law continued in effect in Delhi after the future union territory was split off from Punjab, but the legal situation has no doubt changed over the years. For practical purposes, villagers are concerned only with those major elements of the law which bear directly on the ownership and transfer of real property. In serious disputes, villagers are represented by attorneys. Our major village informant on the subject of land law was a man who had worked in the courts for many years. Although not an attorney, he was well informed and could point

out the essential considerations involved in the way specific villagers handled their property.

16. Aggarawala (1956: 82) reports that the Punjab Land Alienation Act, 1900 has been repealed in Punjab, which means that the distinction between agricultural tribes and nonagricultural tribes has been removed. Restriction of occupancy rights based on this distinction no longer exists.
17. We have previously reported that 261 bighas of land were owned by outsiders in the 1950s (S. Freed and R. Freed, 1978: 23). In reviewing the patwari records, we found that two landowners with 63 bighas were misclassified as outsiders, hence, the revised figure of 198 bighas. The misclassification came about because the land in question was credited to the deceased fathers of the current landowners. These deceased individuals, listed as landowners in the patwari records, were not on our roster of family heads and therefore, by default, fell into the category of outsider. Land records that are not up-to-date are one of the pitfalls of fieldwork.
18. For a history and evaluation of *taccavi* loans, see All-India Rural Credit Survey (1954: 199–208) and Panchanadikar and Panchanadikar (1978: 134–150).
19. The National Commission on Agriculture (1976: 137, 141) reports that land ceilings in both Haryana and Punjab were revised in 1973. The figures for ceilings are almost the same in both states. In Punjab, the ceiling for a family of five for land under assured irrigation that can grow two crops is 7 ha (17.3 acres); the ceiling for irrigated land with one crop is 11 ha (27.2 acres); for *barani* land, it is 20.5 ha (50.6 acres). The ceiling is raised for each family member in excess of five, with a limit of three additional such members. The National Commission does not give separate figures for Delhi Union Territory, but it usually follows the policy of neighboring states. In any case, villagers could cite different figures for land ceilings depending on the context they had in mind. It is not necessarily a question of mistakes or lack of information.
20. Jacobson reported the case of a very wealthy farmer-businessman who owned more land than the entire area of Shanti Nagar. She wrote:

Owning as much land as he does [about 1300 acres, almost all of it non-irrigated], in 1965 Latif Khan was threatened with government land ceiling litigation which would have left him with a relatively small holding. Under state law, however, if he could qualify as a “progressive cultivator,” on the theory that use of modern implements and techniques makes the land more productive than if it were owned by several separate owners practicing traditional methods, he could keep his land. . . . Latif Khan purchased three tractors, which he said was the number government officials felt were needed to till his land. [Jacobson, 1975: 206–207]
21. We do not use the method of payment to mark types of tenants, but others do. Mayer (1970: 79) wrote, “Tenants are of two kinds. There is *sikmi* tenancy, where a fixed sum in cash or kind is paid annually as rent. And there is the *batai* tenancy, where the tenant and owner divide the crop. . . .” Chambard did not mention payment. Instead, following the usage of the village patwari, he distinguished two types of sharecroppers: type A who used his own bullocks and equipment, and type B who used the bullocks and equipment of the landowner (Chambard, 1980: 28, 96n). In Peyrane, France, Wylie used the method of payment to mark two types of tenants, as did Mayer in his village in central India. There are *fermiers*, tenants who pay a cash rent, and *métayers*, who divide the crop equally with the landowner (Wylie, 1964: 22).
22. Narain and Narain (1932) use area rather than number of fields in calculating the percentage of land farmed by tenants. We used number of fields. For the purposes of our calculations, they are equivalent. We based our calculations from the patwari

records on a sample of entries, 27% of the entries in the *Mufasil Jamabandi*, and 15% of the entries in the *Khasra Girdawari*.

23. This extra fee is known as *malikana*. It is a fee paid in recognition of proprietary title. It is said to vary from 5% to 10% of the land revenue (Aggarawala, 1956: xiii). In this case, it amounts to 12.5%.

2: AGRICULTURE, KHARIF SEASON

24. The figures for Delhi Union Territory as a whole show a decline in the area devoted to gram cultivation from 33,700 ha in 1955–1956 to 9,900 ha in 1970–1971. The lowest figure was 4,600 ha during 1968–1969 (Delhi Administration, 1976: 230).
25. India (1939: 15–16) identifies the bleaching agent as “hydros” and the chemical added to *shakkar* as bicarbonate of soda.
26. The Indian Agricultural Research Institute, now in Delhi, was formerly located in Pusa, Bihar. Hence, it is popularly known as the Pusa Institute.
27. The villagers described this caterpillar as a worm. It is the larva of a moth and is a serious pest, infecting tomatoes, cotton, maize, and other plants. It is called the corn earworm, American bollworm, cotton bollworm, or tomato fruitworm. In Punjab, where it attacks especially the cotton crop, it is popularly known as American *sundi*, because it allegedly was introduced into Pakistan and India from the United States. Since the destruction of the World Trade Center in lower Manhattan on September 11, 2001, the government of Pakistan decided to change the name of the pest but only in governmental publicity. The change was motivated by political and strategic considerations in the context of the American-led war against terrorism and the presence of American forces in Pakistan. It is now known as *Heliothis*, but pesticide companies in the private sector still refer to it as American *sundi*. In the text that follows, we generally refer to *sundi* as a worm, especially when we quote villagers (Kalyanam, 1967: 65 and plate 18; Samdani, 2001).

3: AGRICULTURE: FLOWERS, FRUIT, AND TREES

28. Landless villagers received only 2.5 *biswas* in the land consolidation, and so this Leatherworker must have found a way to combine two plots.

4: AGRICULTURE, RABI SEASON

29. This is a reference to the *jajmani* system in which serving castes like the Nai Barbers received payments of wheat and fodder at the harvest (see S. Freed and R. Freed, 1978: 125–126).
30. This estimate is for repairs only. Reformer kept a detailed account of his expenses, which he allowed us to copy for 1976 and 1977. Reformer bought his tractor in 1970 for Rs. 14,000. It was a Russian tractor, a DT-14. Farmers preferred Russian or Czech tractors. Reformer said that the same tractor in 1977 would have cost Rs. 21,000, but none were then available because the Government of India had stopped the purchase of foreign tractors. Another Jat farmer remarked on the fine quality of Reformer's tractor. The prices of tractors varied considerably depending on the make, horsepower, and size. One Jat farmer paid Rs. 28,000 for a tractor in 1970; a comparable machine in 1977 would have cost Rs. 50,000. A quite well-to-do Jat farmer bought a very large new tractor in 1977 that cost Rs. 52,000. We saw it one morning, and it was noticeably larger than the other tractors that we had seen in the village.

Reformer spent Rs. 1320 for repairs in 1976 and Rs. 1788 in 1977. In fact, the two figures are roughly comparable because the latter figure included tractor tire(s) which cost Rs. 765. We are not sure how many tires were involved. Another farmer said that he bought a set of tractor tires for Rs. 2800. Tires had a life span of about six years, but would wear out sooner if run on the road. In 1976, Reformer got by with a retread, which cost only Rs. 150. One could reasonably say that tractor repair and maintenance cost about Rs. 1550 per year in those two years. There are 10 entries for repair and maintenance for each year. This means that on 10 separate occasions per year, Reformer had to spend time taking care of his tractor. In addition to his tractor, he had other equipment to maintain, his trolley, for example. Equipment maintenance was time-consuming.

Diesel oil cost Rs. 2061 in 1976 and Rs. 1982 in 1977, about Rs. 2020 per year. Reformer needed 2.5 liters of diesel fuel to operate his tractor for one hour. Diesel oil cost Rs. 1.33 per liter. Fuel costs were relatively stable from year to year; maintenance varied a good deal because of the occasional large expense, such as tires or a motor replacement, which could cost Rs. 6000. A major motor overhaul cost Rs. 3750.

Writing about Nimkhera, a village in Madhya Pradesh in the mid 1970s, Jacobson (1975: 207–208) points out that tractor maintenance was a big problem. She wrote:

Perhaps the main problem with owning a tractor is that it is likely to break down frequently, and finding parts and mechanics capable of repairing tractors can be quite difficult and expensive. For the ordinary villager, a broken tractor could be a great liability. [Jacobson, 1975: 207]

Despite problems of maintenance, more and more farmers purchased tractors or seriously considered purchasing one. One farmer, Dippal Singh Patel, from a village near Nimkhera, who had recently bought a tractor for Rs. 42,000, said, “‘We’ve had no major problems [for three years] . . . and we’re glad we got the tractor.’” Latif Khan, a rich farmer/businessman who had considerable experience with tractors, was cynical: “‘When these Patels learn how much maintaining a tractor over the years really costs, smoke will come out of their ears! But let them find out!’” (Jacobson, 1975: 208–209).

The maintenance of tractors was less a problem in Shanti Nagar than in Nimkhera. Delhi is not rural central Madhya Pradesh. Latif Khan owned more farmland, almost all of it unirrigated, than all the farmland in Shanti Nagar. He managed with only three tractors and 25 bullocks. His tractors replaced 35 bullocks. There were some 27 tractors in Shanti Nagar. If a tractor broke down, it could usually be quickly repaired in Delhi or Narela, and, in any case, another tractor could be hired.

Farmers talked about tractor maintenance matter-of-factly, which suggested that it was handled without ruinous expense or serious disruption of agricultural operations. One farmer, whose tractor had developed some minor problems, drove it to Narela—only 4 miles north of Shanti Nagar—to be repaired. He hitched a ride back to Shanti Nagar with another farmer. He planned to pick up his tractor the next day. Another farmer, a Jat with a large landholding, had his tractor maintenance done in Delhi at a shop considered to be very good. In the event of a breakdown, a farmer could phone the company, and a repairman would be dispatched, or, alternately, another tractor would tow the disabled one into Delhi. If the repairs were not effective, the company would make an adjustment. For example, he said that once he was driving his tractor back from Delhi after having had it repaired and it caught fire. The company repaired it at no charge. Though his company could repair all

kinds of tractors, farmers usually used a company that specialized in repairing the make of tractor that they owned.

There was another problem with tractors, the danger of fire. A farmer told us that once his son had gone to an uncle's village to help him with his farming. Wheat had been harvested and the sheaves were in a large pile. The tractor gave off a spark which ignited the wheat. Three hundred maunds were lost. We asked if this problem was frequent, and he said that it did occur. We asked if there was crop insurance. He just laughed.

31. Basmati rice has a definite panache. An American firm, RiceTec, was awarded a U.S. patent to use the name Basmati Ricelines and Grains. India fought RiceTec in hearings before the U.S. Patent and Trademark Office, and won a ruling that the company could not use the trade name, Basmati ricelines. Instead, the USPTO granted RiceTec the right to a new title, Ricelines Bas 867, RT 1117, and RT 1121. The ruling of the USPTO stated that "The novel ricelines are semi-dwarf in stature, . . . and high yielding, and produce rice grains having characteristics similar or superior to those of good quality Basmati rice." Reaction in India was mixed. Some people close to the case thought that India had lost. Officialdom, however, thought that the ruling was not a serious setback. One official observed, "Nothing can be done if someone decides to call his product superior. . . . At least, we still have the Basmati name with us. . . ." India's exports of Basmati rice have climbed from \$4.7 million in 1998–1999 to \$27 million in 2000–2001 (Menon and Bhatt, 2001: 12).
32. The Government fixes a number of prices for different crops before the start of their growing seasons. For food grains, especially wheat in Shanti Nagar, the important set prices are the minimum support price and the procurement price. The minimum support price covers not only the costs of production but also insures a reasonable profit margin. A minimum support price is needed to protect farmers from an excessive decline in price during years of bumper crops. The procurement price, generally fixed at a level somewhat higher than the minimum support price but lower than the prevailing market prices, protects consumers who are unable to afford the current market prices. The intent of the Government is to maintain a buffer stock of food grains for distribution through fair price shops. Since the procurement price is lower than the existing market prices, farmers and traders are not willing to sell their stocks voluntarily to the Government. In such circumstances, the Government obtains the food through compulsory methods, such as imposing a levy on farmers. This two-price system is a way of protecting both farmers and consumers.

The system was introduced as part of the Green Revolution, which required that a farmer spend substantial sums for seeds, fertilizer, water, pesticides/herbicides, and machinery. To encourage enterprising farmers to accept the new high-yielding varieties of food grains and all that went with them, the Government decided to institute minimum support prices. Thus, the chief risk for a farmer is not the cost of production. If he obtains a yield that is more or less average, he will not get into too much financial trouble. The principal problem is crop failure. In such a case, a farmer has little to sell and therefore receives small benefit from price supports. See Chapter 6 on the Second Green Revolution. For further information on support prices see India: agricultural knowledge by indiaagronet (2002) and Mitra (2000).

5: DOMESTIC ANIMALS

33. A term is needed to cover both zebu cattle and water buffalo, and we believe that cattle, in a broad sense, is the best choice. In its specific sense, the term cattle refers to domesticated animals of the genus *Bos*. Water buffalo are designated *Bubalus*

bubalis but also *Bos bubalis*. The two animals serve similar functions in Indian villages, principally milk, traction, and dung.

34. Levine et al. (2001: 812) have investigated the hypothesis "... that women with dual working roles perform more work than male cohabitants by performing agricultural work above home-maintenance duties." They objectively and precisely measured the physical activity of 3352 men and women in the Ivory Coast. "The answer to our question was unequivocal. The total work burden of women exceeded that of men by 2.9 hours/day." We did not collect objective data comparable to those of Levine et al. and the Ivory Coast is not India. However, our impression is that women in Shanti Nagar probably spent some two to three more working hours per day than did men.

6: THE SECOND GREEN REVOLUTION: GENETICALLY MODIFIED ORGANISMS

35. Not only can genes from a transgenic variety slip into wild relatives, they can also invade traditional varieties (landraces) with potentially serious implications for biodiversity. Mexico is the center of genetic diversity for maize. To protect this invaluable resource for plant breeders, the Mexican government in 1998 declared a moratorium on growing transgenic maize in the country. Thus it was a thunderbolt when, on February 21, 2002, "... the gene wars took a stunning new twist, or so it seemed. [Government of Mexico] researchers had confirmed University of California (UC), Berkeley, biologist Ignacio Chapela's explosive findings: that transgenic corn was growing in Mexico, the heartland of maize diversity" (Mann 2002a: 1617). Scientists have sharply criticized the research on technical grounds. At the moment, transgenic maize in Mexico has not been proven, but all parties to the dispute agree that it well may be growing there.

The most recent development in the "Mexican maize scandal"—as it is known in newspaper headlines—was the statement of Philip Campbell, editor of *Nature* where the Quist-Chapela article was published (see Quist and Chapela, 2001), that the article should not have been published. The point at issue is not whether transgenic maize is growing in Mexico, but whether Quist and Chapela have presented adequate scientific evidence to support their claim. Mexico imports maize from the United States, and up to 40% is transgenic. Maize kernels used to make tortillas are sold in thousands of stores, and the kernels can be planted. "[I]t is widely assumed that some small farmers have done so" (Mann, 2002b: 237).

36. At least in France, there is a feeling that the debate about transgenic crops may be too strongly biased in favor of their opponents. Writing in *France-Amerique*, the international edition of *Le Figaro*, Moisan, head of the department of medical genetics at the university hospital, Nantes, calls for an impartial informed debate:

It is therefore necessary that a great objective debate take place in our country. ...

Our society will thus make progress and benefit from scientific advances in an objective and evenhanded manner. At the present time, the debate is too unbalanced to the benefit of opponents of the progress brought about by modern biology. Is democracy well respected in such conditions? [Moisan, 2001: 3]

37. Huang et al. do not mention how the Chinese are dealing with the problem of pests that develop resistance to Bt toxins. The Bt gene is no magic bullet that will forever keep targeted pests at bay. Resistance to Bt toxins has already evolved, which means that efforts are needed to slow the evolutionary pace and prolong the effectiveness

of the toxins. Several methods are helpful. If resistant insects are detected, farmers could be alerted to stop planting Bt crops and switch to chemical pesticides for a while (Stokstad, 2001: 778). Refuge planting is another strategy to slow the evolutionary development of resistance. Farmers plant part of a field with crop varieties lacking the toxic gene. The insects that eat these plants are nonresistant. They mate with a smaller number of resistant pests emerging from fields of plants that produce toxins. "This mechanism functions by reducing the inheritance of resistance through increases in the proportion of breeding individuals without resistance alleles" (Palumbi, 2001: 1789). The war between plants and parasites is ongoing. Science will probably never win the war, but with luck could avoid disasters like the Irish potato famine.

38. Ecoterrorism appears to be more common in the United States than in India, probably because there is more research on genetic engineering in America. Eleven incidences of ecoterrorism against research facilities were reported in America in 2000, and a comparable pace was maintained in 2001 (Service, 2001: 1622, table).

REFERENCES

- Adams, W.Y. 1986. Life and work among the Navajo: recollections of a vanished era. MS on file with S. Freed.
- Aggarawala, O.P. 1956. The Punjab Tenancy Act, 1887. 5th ed. Delhi: Metropolitan Book Company.
- All-India Rural Credit Survey. 1954. Report of the Committee of Direction. Vol. 2, The general report. Bombay: Reserve Bank of India.
- Attwood, D.W. 1992. Raising cane: the political economy of sugar in western India. Boulder, CO: Westview Press.
- Bailey, F.G. 1957. Caste and the economic frontier. Manchester: The University Press.
- Bailey, R. 2001. Dr. Strangelunch. Or, why we should stop worrying and love genetically modified food. http://www.findarticles.com/cf_0m1568/8_32/68742823/print.jhtml. April 5, 2001. Reason, Jan. 2001.
- Barrier, N.G. 1966. The Punjab Alienation of Land Bill of 1900. Program in Comparative Studies on Southern Asia, Commonwealth-Studies Center. Monograph and Occasional Paper Series 2. Durham, NC: Duke University.
- Basant, R. 1987a. Agricultural technology and employment in India. *Economic and Political Weekly* 22(31): 1297-1308.
- Basant, R. 1987b. Agricultural technology and employment in India. *Economic and Political Weekly* 22(32): 1348-1364.
- Basham, A.L. 1954. The wonder that was India. New York: Grove Press.
- Berremen, G.D. 1968. Ethnology: method and product. In J.A. Clifton (editor), *Introduction to cultural anthropology*: 337-373. Boston: Houghton Mifflin.
- Bhalla, G.S., and D.S. Tyagi. 1989. Spatial pattern of agricultural development in India. *Economic and Political Weekly* 24(25): A-46-A-56.
- Bhalla, S. 1989. Technological change and women workers. *Economic and Political Weekly* 24(43): WS-67-WS-78.
- Binns, Bernard O., Sir. 1950. The consolidation of fragmented agricultural holdings. Washington, DC: Food and Agricultural Organization of the United Nations. (Reprinted 1953.)
- Blyn, G. 1983. The green revolution revisited. *Economic Development and Cultural Change* 31: 705-725.
- Bonner, J.P. 1987. Land consolidation and economic development in India, a study of two Haryana villages. Riverdale, MD: The Riverdale Company.
- Borlaug, N. 2001. The green revolution: peace and humanity. [A speech on the occasion of the awarding of the 1970 Nobel Peace Prize in Oslo, Norway, on Dec. 11, 1970]. <http://www.theatlantic.com/issues/97jan/borlaug/speech.htm>. Apr. 5, 2001.
- Broyles, W., Jr. 1983. A celebration of America. In W. Broyles, Jr. (editor), *The American dream*. Newsweek, special anniversary issue, spring: 3.
- Carpenter, J. 2001. GM crops and patterns of pesticide use. *Science* 292: 637.
- Chadha, G.K. 1979. Production gains of new agricultural technology. Chandigarh: Panjab University.
- Chadha, G.K., and M.R. Khurana. 1989. Backward agriculture, unrewarded labour and economic deprivation: Bihar's contrast with Punjab. *Economic and Political Weekly* 24(47): 2617-2623.
- Chadney, J.G. 1984. Socio-economic implications of the new technologies in Punjab. *Eastern Anthropologist* 37: 227-237.
- Chambard, J.-L. 1980. *Atlas d'un village indien*. Éditions de l'École des Hautes Études en Science Sociales. Paris: Mouton.
- Chand, R., and T. Haque. 1998. Rice-wheat crop system in Indo-Gangetic region: issues concerning sustainability. *Economic and Political Weekly* 33(26): A108-A112.
- Chhaya, M. 1993a. Murdoch's impact on the TV revolution. *India Abroad* Aug. 13: 2.
- Chhaya, M. 1993b. The changing attitudes toward sex. *India Abroad* Aug. 27: 28.
- Chhaya, M. 1993c. Murdoch buys into Zee TV. *India Abroad* Dec. 31: 41.
- Crooke, W. 1989. A glossary of north Indian peasant life. Delhi: Oxford University Press.
- Crossette, B. 1991. India's descent. *New York Times Magazine*. May 19: 26-31, 57, 60, 67.
- Daily, G., P. Dasgupta, B. Bolin, P. Crosson, J. du Guerny, P. Ehrlich, C. Folke, A.M. Jansson, B.-O. Jansson, N. Kautsky, A. Kinzig, S. Levin, K.-G. Mäler, P. Pinstrup-Andersen, D. Siniscalco, and B. Walker. 1998. Food production, population growth, and the environment. *Science* 281: 1291-1292.

- Damodaran, A. 2001. Regulating transgenic plants in India: biosafety, plant variety protection and beyond. <http://www.epw.org.in/34-13/ra5.htm>. Mar. 27, 2001. *Economic and Political Weekly, Review of Agriculture* Mar. 27–Apr. 2, 1999.
- Dandekar, V.M. 1969. India's sacred cattle and cultural ecology. *Economic and Political Weekly* 4: 1559–1566.
- Dandekar, V.M. 1973. Impact of cattle on land. *Janata* 28:19–21.
- Darling, M., Sir. 1978. The Punjab peasant in prosperity and debt. 1st ed., 1925. Columbia, MO: South Asia Books.
- Delhi Administration. 1976. Delhi gazetteer. Nasik: Government of India press.
- Dewey, C.J. 1978. Editor's introduction. In M. Darling, *The Punjab peasant in prosperity and debt: i–xxv*. Columbia, MO: South Asia Books.
- Dhawan, K.C. 1980. Impact of tractorisation on cropping pattern, resource use and farm earnings in the Punjab state. *Economic Affairs (Calcutta)* 25(4–6): 121–131.
- Dugger, C. 2000. Chidambaram Subramaniam, India's 'Green' Rebel, 90, Dies. *The New York Times*, Nov. 10: B11.
- Easterbrook, G. 1997. Forgotten benefactor of humanity. *Atlantic Monthly* 279(1): 75–82.
- Elder, J.W. 1962. Land consolidation in an Indian village: a case study of the Consolidation of Holdings Act in Uttar Pradesh. *Economic Development and Cultural Change* 11(1): 16–40.
- Farwell, B. 1989. *Armies of the Raj: from the great Indian Mutiny to Independence: 1858–1947*. New York: Norton.
- Freed, R.S. 1971. The legal process in a village in north India: the case of Maya. *Transactions of the New York Academy of Sciences. Series 2*, 33(4): 423–435.
- Freed, R.S., and S.A. Freed. 1979. Shanti Nagar: the effects of urbanization in a village in north India. 3. Sickmess and health. *Anthropological Papers of the American Museum of Natural History* 55(2): 285–348.
- Freed, R.S., and S.A. Freed. 1980. Rites of passage in Shanti Nagar. *Anthropological Papers of the American Museum of Natural History* 56(3): 323–554.
- Freed, R.S., and S.A. Freed. 1981. Enculturation and education in Shanti Nagar. *Anthropological Papers of the American Museum of Natural History* 57(2): 51–156.
- Freed, R.S., and S.A. Freed. 1985. The psycho-medical case history of a low-caste woman of north India. *Anthropological Papers of the American Museum of Natural History* 60(2): 101–228.
- Freed, R.S., and S.A. Freed. 1993. Ghosts: life and death in north India. *Anthropological Papers of the American Museum of Natural History* 72: 1–396.
- Freed, S.A. 1963a. Fictive kinship in a north Indian village. *Ethnology* 2(1): 86–103.
- Freed, S.A. 1963b. An objective method for determining the collective caste hierarchy of an Indian village. *American Anthropologist* 65(4): 879–891.
- Freed, S.A. 1970. Caste ranking and the exchange of food and water in a north Indian village. *Anthropological Quarterly* 43(1): 1–13.
- Freed, S.A., and R.S. Freed. 1969. Urbanization and family types in a north Indian village. *Southwestern Journal of Anthropology* 25(4): 342–359.
- Freed, S.A., and R.S. Freed. 1972. Cattle in a north Indian village. *Ethnology* 11(4): 399–408.
- Freed, S.A., and R.S. Freed. 1976. Shanti Nagar: the effects of urbanization in a village in north India. 1. Social organization. *Anthropological Papers of the American Museum of Natural History* 53(1): 1–254.
- Freed, S.A., and R.S. Freed. 1978. Shanti Nagar: the effects of urbanization in a village in north India. 2. Aspects of economy, technology, and ecology. *Anthropological Papers of the American Museum of Natural History* 55(1): 1–153.
- Freed, S.A., and R.S. Freed. 1981. Sacred cows and water buffalo in India: the uses of ethnography. *Current Anthropology* 22(5): 483–502.
- Freed, S.A., and R.S. Freed. 1982. Changing family types in India. *Ethnology* 21(3): 189–202.
- Freed, S.A., and R.S. Freed. 1983. The domestic cycle in India: natural history of a will-o'-the-wisp. *American Ethnologist* 10(4): 312–317.
- Freed, S.A., and R.S. Freed. 1985. Fertility, sterilization, and population growth in Shanti Nagar, India: a longitudinal ethnographic approach. *Anthropological Papers of the American Museum of Natural History* 60(3): 229–286.
- Freed, S.A., and R.S. Freed. 1986. The egg business lays an egg. *Faces: the Magazine about People* 2(6): 28–30.
- Freed, S.A., and R.S. Freed. 1987. Uncertain revolution: panchayati raj and democratic elections in a north Indian village. *Anthro-*

- pological Papers of the American Museum of Natural History 64(1): 1–78.
- Freed, S.A., and R.S. Freed. 1998. Hindu festivals in a north Indian village. *Anthropological Papers of the American Museum of Natural History* 81: vii, 1–326.
- Friedel, R. 2000. Why you need to understand Y2K. *American Heritage of Invention and Technology* 15(3): 24–31.
- Ganapati, P. 2002. GM crops spark off heated debate in India. *India Abroad* Apr. 19: 32.
- Gastaldi, J., and M. Vallery-Radot. 1976. *Le remembrement agricole et rural*. Coutances: OCEP.
- Gavan, J.D., and J.A. Dixon. 1975. India: a perspective on the food situation. *Science* 188 (4188): 541–549.
- Geertz, C. 1968. *Agricultural involution: the processes of ecological change in Indonesia*. Berkeley: University California Press.
- George, S. 1984. Diffusing Anand: implications of establishing a dairy co-operative in a village in central Kerala. *Economic and Political Weekly* 19(52, 53): 2161–2170.
- Gewolb, J. 2001. India's scorched earth policy. *Science* 294: 991.
- Gewolb, J. 2002. Plant scientists see big potential in tiny plastids. *Science* 295: 258–259.
- Gilbert, Martin. 1994. *The First World War: a complete history*. New York: Holt.
- Goujon, J.-P. 1977. La réforme du remembrement. *Le producteur agricole français* 53(203): 40–42.
- Goujon, J.-P. 1979. La récente réforme des SAFER. *Le producteur agricole français* 55(260): 26–28.
- Gulick, J. 1973. Urban anthropology. In J. Honigsmann (editor), *Handbook of social and cultural anthropology*: 979–1029. Chicago: Rand McNally.
- Herring, R.J. 2001. Promethean science, Pandora's jug: conflicts around generically engineered organisms in India. The 2001 Mary Keatinge Das Lecture, Columbia University, New York, Dec. 3, 2001. MS on file with the author, rjh5@Cornell.edu.
- Holden, C., editor. 2000. Random samples: India's vultures declining. *Science* 289(5485): 1679.
- Huang, J., S. Rozelle, C. Pray, and Q. Wang. 2002. Plant biotechnology in China. *Science* 295: 674–676.
- Huylenbroeck, G. Van, J. Castro Coelho, and P.A. Pinto. 1996. Evaluation of land consolidation projects (LCPs): a multidisciplinary approach. *Journal of Rural Studies* 12(3): 297–310.
- India. 1912. *Delhi District, with maps*. Lahore: Civil and Military Gazette Press.
- India. 1939. A report on *gur*-making outfits in India and their relative performances. India: Imperial Council of Agricultural Research.
- India. 1960. *The Delhi Land Holdings (Ceiling) Act, 1960*. Food and Agricultural Legislation, vol. X, No. 2, Fasc. 3/V1: 1–12.
- India. 1972. Ceiling on agricultural holdings. *Mainstream* 10(37): 10, 39–41 (Part 1); 10(38): 23–39 (Part 2). India: Department of Agriculture, Central Land Reforms Committee.
- India. 1978. *India: a reference annual 1977 and 1978*. Publications Division, Ministry of Information and Broadcasting, Government of India.
- India Abroad. 1993a. Couple beheaded by villagers. August 20: 8.
- India Abroad. 1993b. Job-reservation plan to begin. Sept. 17: 20.
- India Abroad. 1998. Rains play havoc with crops in the north. Oct. 30: 35.
- India Abroad. 2001. Man who was behind the Green Revolution. Nov. 17: 42.
- India: Agricultural Knowledge by indiaagronet. 2002. Price fixation and open market. http://www.indiaagronet.com/indiaagronet/Agri_marketing/contents/Price%20Fixation.htm. June 18, 2002.
- Indian Express. 1978. Malaria epidemic in worst form this year. Apr. 19: 3.
- Jacobson, D. 1975. Separate spheres: differential modernization in rural central India. In H. Ullrich (editor), *Competition and modernization in South Asia*: 179–238. New Delhi: Abhinav Publications.
- Johl, S.S. 1975. Gains of the green revolution: how they have been shared in Punjab. *Journal of Development Studies* 11: 178–189.
- Johnson, K. 2000. *Television and social change in rural India*. New Delhi: Sage Publications.
- Johnston, D.F. 1966. An analysis of sources of information on the population of the Navaho. Smithsonian Institution, Bureau of American Ethnology, Bulletin 197. Washington, DC: U.S. Government Printing Office.
- Journal Officiel de l'État Français. 1941. Loi du 9 mars 1941 sur la réorganisation de la propriété foncière et le remembrement [Law of Mar. 9, 1941 on the reorganization of landed property and land consolidation]. Apr. 18: 1658–1662.
- Journal Officiel de l'État Français. 1942. Décret no. 37 du 7 janvier 1942 portant règlement d'administration publique pour l'application de la loi du 9 mars 1941 sur la réorganisation

- de la propriété foncière et le remembrement [Decree number 37, Jan. 7, 1942 giving the administrative rules for the implementation of the law of Mar. 9, 1941 on the reorganization of landed property and land consolidation]. Jan. 29: 408–412.
- Journal Officiel de l'État Français. 1944. Loi no. 194 du 19 avril 1944 relative à la mise en oeuvre de la loi du 9 mars 1941 sur la réorganisation de la propriété foncière et le remembrement [Law number 194 of Apr. 19, 1944 relative to the implementation of the law of Mar. 9, 1941 on the reorganization of landed property and land consolidation]. May 3, 1944: 2214.
- Kaiser, J. 2001. Breeding a hardier weed. *Science* 293: 1425–1427.
- Kaiser, J., C. Holden, and P. Bagla. 2002. India OKs GM cotton. *Science* 295: 2345.
- Kalyanam, N.P. 1967. *Common insects of India*. Bombay: Asia Publishing House.
- Kay, H.D. 1974. Milk and milk production. In W.R. Cockrill (editor), *The husbandry and health of the domestic buffalo*: 329–376. Rome: Food and Agriculture Organization of the United Nations.
- Kerblay, B. 1971. Chayanov and the theory of peasantry as a specific type of economy. In T. Shanin (editor), *Peasants and peasant societies*: 150–160. Baltimore, MD: Penguin.
- Kessinger, T.G. 1974. *Vilyatpur 1848–1968: social and economic change in a north Indian village*. Berkeley: University of California Press.
- Larousse, P. 1982. *Grand dictionnaire universel du XIX^e siècle*. Genève-Paris: Slatkine.
- Leaf, M.J. 1980–1981. The green revolution in a Punjab village, 1965–1978. *Pacific Affairs* 53: 617–625.
- Leaf, M.J. 1982. The green revolution and cultural change in a Punjab village, 1965–1978. *Economic Development and Cultural Change* 31: 227–270.
- Leaf, M.J. 1984. *Song of hope: the green revolution in a Panjab village*. New Brunswick, NJ: Rutgers University Press.
- Levine, J.A., R. Weisell, S. Chevassus, C.D. Martinez, B. Burlingame, and W.A. Coward. 2001. The work burden of women. *Science* 294: 812.
- Lewis, O. 1958. *Village life in northern India*. Urbana: University of Illinois Press.
- Lewontin, R. 2001. Genes in the food! *The New York Review of Books* June 21: 81–84.
- Maheshwari, J.K. 1976. *The flora of Delhi*. New Delhi: INSDOC.
- Mamoria, C.B. 1980. *Economic and commercial geography of India*. Delhi: Shiva Lal Agarwala.
- Mankekar, Purnima. 1999. *Screening culture, viewing politics: an ethnography of television, womanhood, and nation*. Durham, NC: Duke University Press.
- Mann, C. 1999a. Crop scientists seek a new revolution. *Science* 283: 310–314.
- Mann, C. 1999b. Genetic engineers aim to soup up crop photosynthesis. *Science* 283: 314–316.
- Mann, C. 2002a. Has GM corn 'invaded' Mexico? *Science* 295: 1617–1619.
- Mann, C. 2002b. Transgene data deemed unconvincing. *Science* 296: 236–237.
- Marriott, Mc. 1973. New farmers in an old village. In M. Singer (editor), *Entrepreneurship and modernization of occupational cultures in South Asia*. Duke University. Program in Comparative Studies on Southern Asia Monograph and Occasional Papers Series 12: 205–215.
- Martineau, B. 2001. Food fight: the short, unhappy life of the Flavr Savr tomato. *Sciences* 41(2): 24–29.
- Marvier, M. 2001. Ecology of transgenic crops. *American Scientist* 89: 160–167.
- Mayer, A.C. 1970. *Caste and kinship in central India: a village and its region*. Berkeley: University of California Press.
- Mayle, P. 1991. *Toujours Provence*. New York: Knopf.
- Mead, M. 1970. The art and technology of field work. In R. Naroll and R. Cohen (editors), *A handbook of method in cultural anthropology*: 246–265. New York: Natural History Press.
- Menon, R., and S. Bhatt 2001. Will India rice and shine. *India Abroad* Aug. 31: 12.
- Miller, B.D. 2001. Female-selective abortion in Asia: patterns, policies, and debates. *American Anthropologist* 103(4): 1083–1095.
- Mitra, A. 2000. Starvation amidst plenty. <http://www.rediff.com/news/2000/dec/22mitra.htm>. June 18, 2002.
- Moisan, J.-P. 2001. Génétique: trop de craintes irraisonnées. *France-Amérique*, 1–7 Sept.: 3.
- Mozumder, S.G. 1993. Fake sex specialists are thriving. *India Abroad* Aug. 27: 30.
- Nadeau, M. 1972. *Préface*. In *Madame Bovary* by G. Flaubert. Gallimard.
- Nanda, H.S. 1998. Debt-ridden farmers continue to end their lives. *India Abroad* Oct. 16: 8.
- Nangia, S. 1976. *Delhi metropolitan region: a study in settlement geography*. New Delhi: K.B. Publications.

- Narain, R., and B. Narain. 1932. An economic survey of Gijhi, a village in the Rohtak district of the Punjab. The Board of Economic Inquiry, Punjab. Punjab Village Surveys—2.
- Nash, J. 2000. Grains of hope. *Time*, large ed., July 31: 30–41.
- Nath, V. 1991. 1991 population census: some facts and policy issues—II. *Economic and Political Weekly* 26(51): 2937–2942.
- National Commission on Agriculture. 1976. Report of the National Commission on Agriculture, 15. New Delhi: Government of India Press.
- Nayar, Ranvir. 1998. A French village still remembers its Indian war hero. *India Abroad* Sept. 11: 15.
- Nicholson, N.K. 1984. Landholding, agricultural modernization, and local institutions in India. *Economic Development and Cultural Change* 32: 569–592.
- Normile, D. 2000a. Hopes grow for hybrid rice to feed developing world. *Science* 288: 429.
- Normile, D. 2000b. Asia gets a taste of genetic food fights. *Science* 289: 1279, 1281.
- Padmanabhan, A. 2000. Commercial benefits of growing genetically modified crops. *India Abroad* Aug. 4: 28.
- Pagnol, M. 1988. *Jean de Florette*. Paris: Editions de Fallois.
- Palumbi, S. R. 2001. Humans as the world's greatest evolutionary force. *Science* 293: 1786–1790.
- Panchanadikar, K.C., and J. Panchanadikar. 1978. Rural modernization in India: a study in developmental infrastructure. Bombay: Popular Prakashan.
- Pattanayak, S., and R.G. Roy. 1980. Malaria in India and the modified plan of operations for its control. *Journal of Communicable Disease* 12(1): 1–13.
- Peignot, B., C. Minard-Libeau, and V. Déaud. 1999. *Le remembrement rural*. Paris: Group France Agricole.
- Peters, W. 1975. Guest editorial. *Journal of Tropical Medicine and Hygiene* 78(8): 167–170.
- Pradhan, S. 1994. Youth commits suicide over reservation policy. *India Abroad* Aug. 5: 25.
- Quist, D., and I. Chapela. 2001. Transgenic DNA introgressed into traditional maize landraces in Oaxaca, Mexico. *Nature* 414: 541–543.
- Rao, C.H.H. 1998. Agricultural growth, sustainability and poverty alleviation: recent trends and major issues of reform. *Economic and Political Weekly* 33(29): 1943–1948.
- Rao, S.V.N., V. Venkatasubramanian, and J. De Wit. 1995. Consequences of crossbreeding programme in India. *Economic and Political Weekly*, 30(39): A-112–A-116.
- Redfield, R. 1941. *The folk culture of Yucatan*. Chicago: University of Chicago Press.
- Roberts, D. 2001. Letters to the editors. *American Scientist* 89: 195.
- Saha, M.N. 1956. Fuel in India. *Nature* 177: 923–924.
- Samdani, Z. 2001. Pest renamed as part of new policy. <http://www.dawn.com/2001/09/28/nat16.htm>.
- Saperstein, A.M. 1995. War and chaos. *American Scientist* 83: 548–557.
- Sarkad, U. 1975. Malaria rides again. *Journal of the Indian Medical Association* 65(6): 185–186.
- Service, R.F. 2001. Arson strikes research labs and tree farm in Pacific northwest. *Science* 292: 1622–1623.
- Shanin, T. 1971a. Introduction. In T. Shanin (editor), *Peasants and peasant societies*: 11–19. Baltimore, MD: Penguin.
- Shanin, T. 1971b. Peasantry as a political factor. In T. Shanin (editor), *Peasants and peasant societies*: 238–263. Baltimore, MD: Penguin.
- Sharma, D. 2000. Infancy and childhood in India: a critical review. *International Journal of Group Tensions* 29(3/4): 219–251.
- Sharma, D., and R.A. LeVine. 1998. Child care in India: a comparative developmental view of infant social environments. *New Directions for Child Development* 81: 45–67.
- Shergill, H. 1989. Agrarian structure as a factor in rural poverty: some cross-section evidence. *Economic and Political Weekly* 24(12): A-9–A-12.
- Shiva, V. 1991. Biotechnology development and conservation of biodiversity. *Economic and Political Weekly* 26(48): 2740–2746.
- Shiva, V. 2001. Genetically engineered vitamin A rice: a blind approach to blindness. http://web3.infotrac.gale.com/purl=rcl_EAIM_0_A71200434&dyn=20!ar_fmt?sw_aep=cuny_mai. Apr. 5, 2001. Synthesis/Regeneration, Fall 2000.
- Singh, D.P. 1980. The impact of the green revolution on the poor. *Agricultural Situation in India* 35: 317–325.
- Singh, P. 1975. Emerging pattern of economic life in Punjab. Bombay: Thacker.
- Singh, S. 1925. An inquiry into mortgages of agricultural land in the Kot Kapura Utar Assessment Circle of the Ferozepore District

- in the Punjab. In H. Calvert (editor), *The Board of Economic Inquiry, Punjab. Rural section publication 5: i–viii*, 1–30.
- Singh, S., and R. Branford. 1935. A cattle survey of the Rohtak District in the Punjab. Board of Economic Inquiry, Punjab. Publication 41.
- Somerville, C., and J. Briscoe. 2001. Genetic engineering and water. *Science* 292: 2217.
- Stokstad, E. 2001. First light on genetic roots of Bt resistance. *Science* 293: 778.
- Suggu, K. 2002. India allows production of BT cotton variety. *India Abroad* Apr. 5: 32.
- Sundaresan, D. 1975. *Livestock breeding in India*. Delhi: Vikas.
- Swaminathan, M.S. 2000. Science in response to basic human needs. *Science* 287: 425.
- Tandon, P. 1968. *Punjabi century, 1857–1947*. Berkeley: University of California Press.
- Tata Services Limited. 1992. *Statistical outline of India, 1992–93*. Bombay: Tata Services Limited.
- Thorner, D., B. Kerblay, and R. Smith (editors). 1966. *A.V. Chayanov on the theory of peasant economy*. Homewood IL: American Economic Association.
- Vallery-Radot, M. 1968. *Remembrement rural et jurisprudence du Conseil d'État*. Coutances: Éditions OCEP.
- Varadarajan, V.K. 1990. Stagnant phase in pulses. In *Hindu survey of Indian agriculture, 1990*: 57, 59. Madras: National Press.
- Vasdev, K. 2001. Mentha crop faces pest attack: farmers may face huge losses. <http://www.tribuneindia.com/20010601/1dh2.htm>.
- Vial, A. 1969. Land reform in France, the role of the SAFERs. *Span* 12(1): 41–44.
- Visaria, P., and L. Visaria. 1981. Indian population scene after 1981 census: a perspective. *Economic and Political Weekly* 16(44–46): 1717–1780.
- Weiss, G. 2001. Government shoots down GM plant trials. *Science* 294: 2067, 2069.
- Whitney, S., and J. Andrews. 2001. Plastome-encoded bacterial ribulose-1,5-biophosphate carboxylase/oxygenase (RubisCO) supports photosynthesis and growth in tobacco. *Proceedings of the National Academy of Sciences of the United States of America* 98(25): 14738–14743.
- Wood, O., and R. Maconachie. 1882. *Final report on the settlement of land revenue in the Delhi district*. Lahore: Victoria Press.
- Wylie, L. 1964. *Village in the Vaucluse*. New York: Harper and Row.

INDEX AND GLOSSARY

NOTE: Hindi words contained in *Webster's Third New International Dictionary, Unabridged*, are not italicized in the index. Unitalicized words also include commonly used terms, such as rabi and kharif. Other Hindi words are italicized and given their customary Romanized spellings without diacritics (e.g., *biradari*). English plurals and possessives are used (e.g., *kunba*, *kunbas*) except when *Webster's* gives the Hindi plural. Brief definitions are given for all Hindi and French words. Fuller definitions can often be found in the text, usually the first time that the term is mentioned.

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